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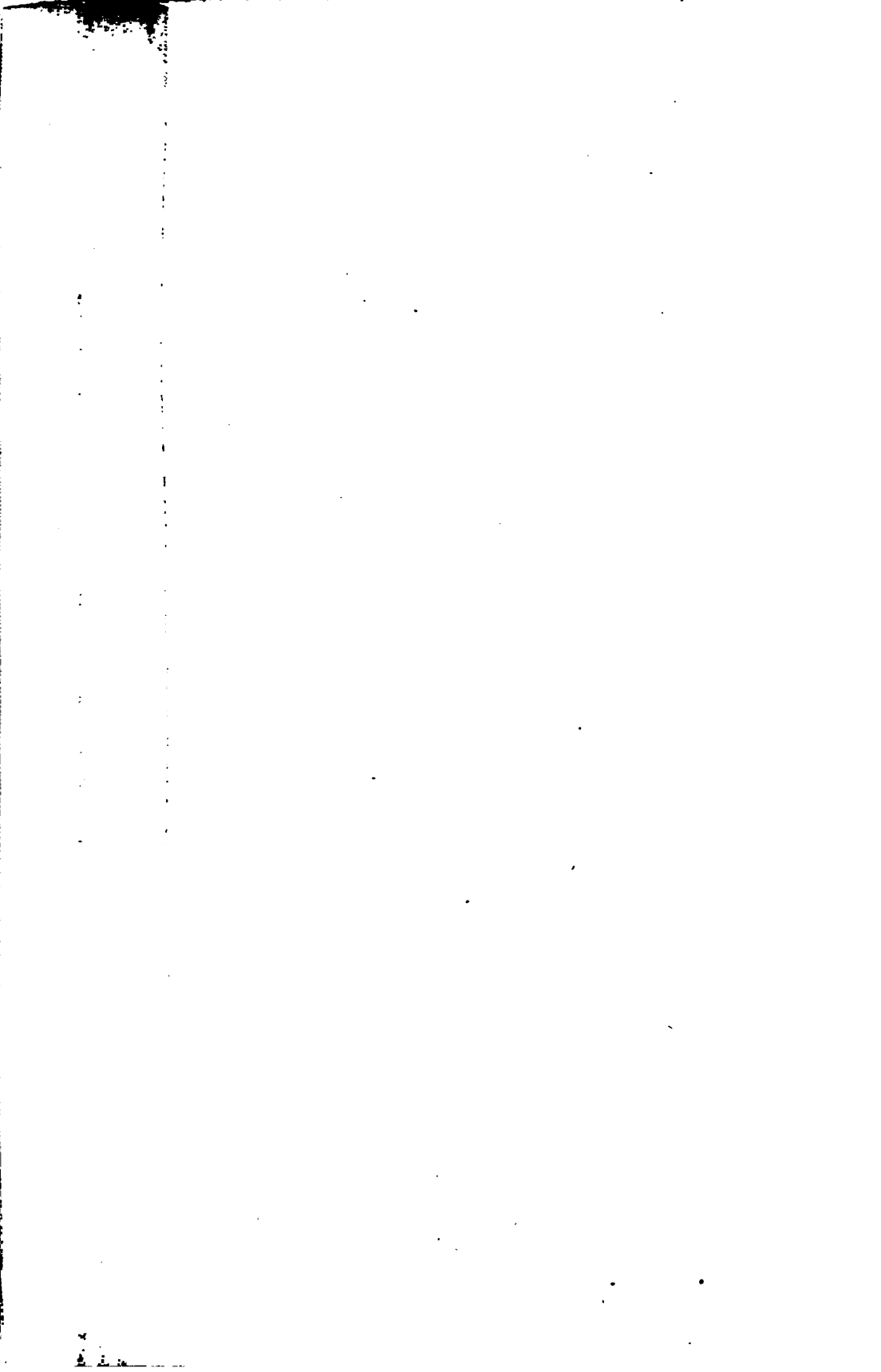
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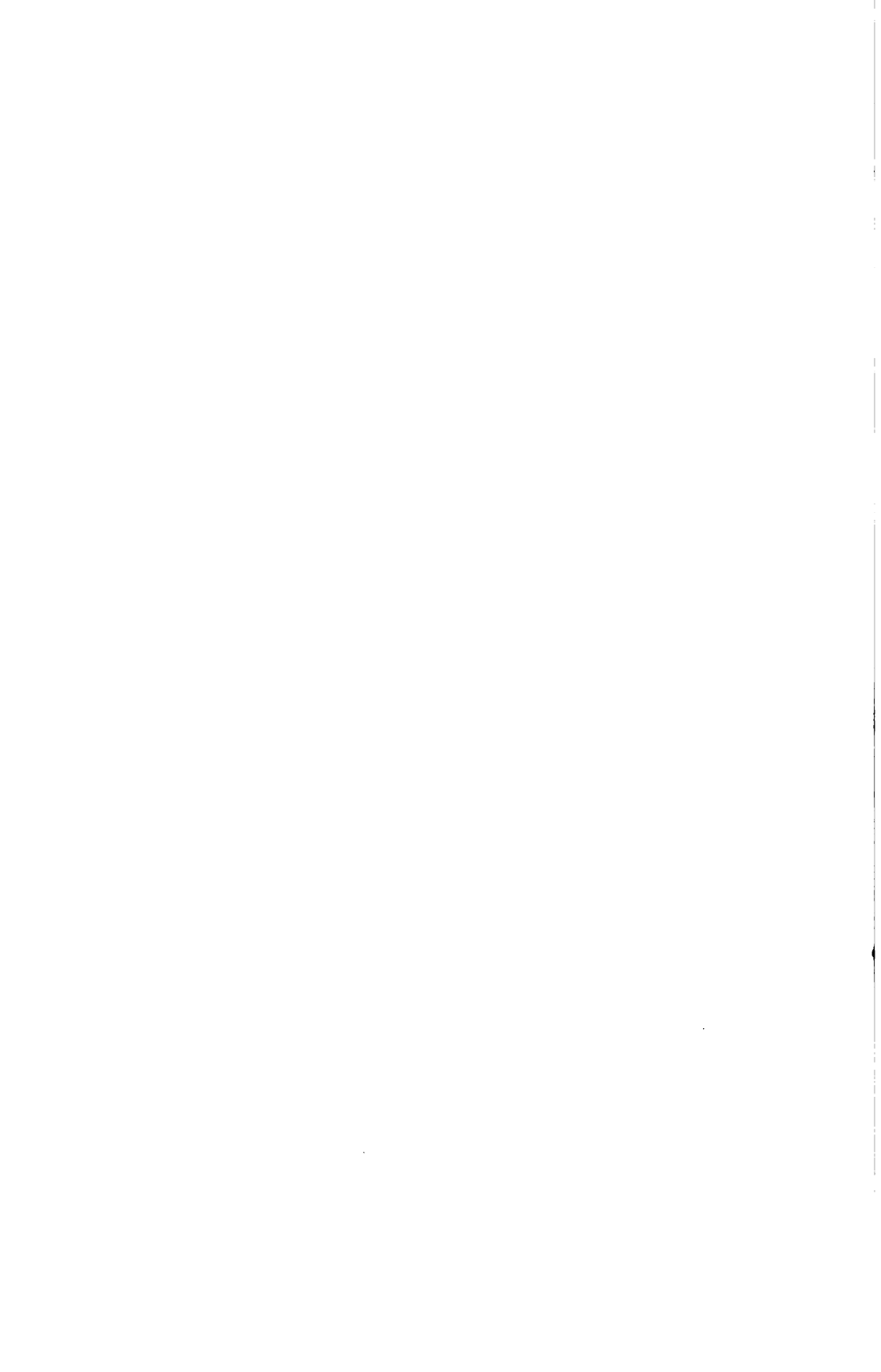


The Gift of
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PRACTICAL THERAPEUTICS



✓ PRACTICAL THERAPEUTICS

INCLUDING MATERIA MEDICA AND PRESCRIPTION WRIT-
ING, WITH A DESCRIPTION OF THE MOST IMPORTANT
NEW AND NONOFFICIAL REMEDIES PASSED UPON
BY THE COUNCIL ON PHARMACY AND CHEMISTRY
OF THE AMERICAN MEDICAL ASSOCIATION.

BY

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SECOND EDITION
REVISED AND REWRITTEN

ST. LOUIS
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1914

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**TO
MY FATHER,
REV. WAYLAND HOYT, D.D., LL.D.
THIS VOLUME IS AFFECTIONATELY
DEDICATED**

Preface to Second Edition.

The purpose of this book is to present a brief summary of the physiological actions of drugs, with particular emphasis being given to their clinical applications; to show the importance of simple, rational prescribing, based (wherever possible) on known physiological actions; and to indicate the limitations, as well as the value of drugs in the treatment of disease.

This edition has been thoroughly revised, rewritten, and enlarged. It now includes, not only the important preparations of the U. S. Pharmacopœia and the National Formulary, but also those of the New and Nonofficial Remedies, permission to include these having been granted by the American Medical Association, for which privilege the author wishes to express his thanks.

A number of illustrations have been used to show the effect of drugs upon the circulation. The original tracings for these reproductions were kindly loaned by Professor A. N. Richards, of the Laboratory of Pharmacology, University of Pennsylvania.

There has also been added a brief outline of vaccine therapy, a chapter on the proprietary medicine evil, and a short article on suggestions and limitations in office dispensing.

This edition has been re-indexed, making it now a ready reference book, especially for the dispensing, dosage, and uses of the important newer remedies.

D. M. Horr, M. D.

Philadelphia, Pa.,
May 1, 1914.

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Practical Therapeutics.

CHAPTER I.

GENERAL CONSIDERATIONS.

PHYSIOLOGICAL ACTION OF DRUGS.

The **local action** of a drug is that effect which it produces when applied directly to a part in concentrated form.

The **general action** of a drug is that effect which it produces when circulating in the blood or lymph.

The **primary action** of a drug is that effect which it first produces upon the function of an organ or centre.

The **secondary action** of a drug is the result of an over-primary action and is almost always depressant; in other words, a drug which primarily stimulates secondarily depresses. For instance, atropin first stimulates the heart, but if given too long the heart becomes exhausted as a result of the stimulation, and we have the secondary action or depression.

Some drugs exert **collateral effects**; that is, effects which interfere with the therapeutic purpose for which they are given. For instance, the therapeutic effect of the salicylates is to relieve pain; the collateral effect is to disturb digestion.

In studying the physiological action of drugs we take into account, first, the local action, which may be irritant, antiseptic, or anæsthetic. Next, the general action, which includes the effect on the nervous system, the secretions, the respiration, the circulation, the temperature, the rate of absorption and elimination, and the special action.

BRIEF REVIEW OF PHYSIOLOGY.

Roughly speaking, the nervous system consists of the brain, the medulla, the spinal cord with sensory and motor ganglia, the motor nerves, the sensory nerves, and the motor and sensory end-plates. In the medulla we have certain important centres which are par-

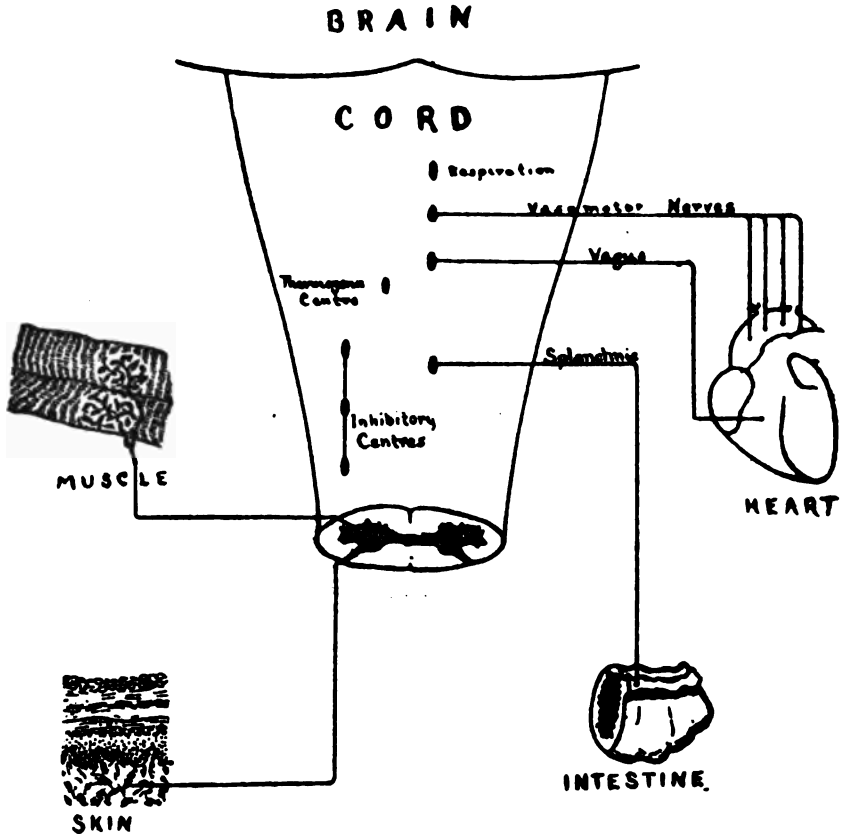


Fig. 1.

Diagram of the More Important Structures Affected by Drugs.

Brain. In the medulla we have the following important centers: Respiratory center; vasomotor center; pneumogastric center; inhibitory centers along the course of the spinal cord. The reflex arc is made up of the muscle; the motor nerve; the motor ganglion; the sensory ganglion; the sensory nerve; the skin, containing the sensory end plates. Splanchnic center; Splanchnic nerve; Intestine; Vasomotor nerves from vasomotor center to blood vessels; Pneumogastric nerve from pneumogastric center to peripheral ganglion in heart muscle; Heart.

In studying the physiological action of drugs, we think of the following points: Local, Brain, Reflex Arc, Pupil, Secretion, Respiration, Circulation, Temperature, Elimination, Special Action.

ticularly influenced by drugs; they are the respiratory, the thermogenic, and the pneumogastric centres.

Stimulation of the respiratory centre produces an increase either in the rate or in the depth of **respiration**; depression produces the reverse.

Stimulation of the thermogenic centre causes an increase in body temperature; depression the reverse. Of the vasomotor and pneumogastric centres we will speak later.

The reflex arc consists of the motor nerves and end-plates, the motor ganglia, the sensory ganglia, the sensory nerve and end-plates, and usually the skin and muscle. Any drug that stimulates any portion of this arc increases the reflexes; any drug that depresses any portion of it decreases the reflexes. Throughout the spinal cord there are certain inhibitory centres, which act as brakes to lessen over-excitability of the reflexes, hence their stimulation causes a lessening of reflex activities.

Brain.—Generally speaking, a drug either stimulates or depresses the brain.

Circulation.—The circulation consists of the heart, the blood-vessels and a nervous mechanism governing the same. The pneumogastric centre is connected with the heart by the pneumogastric nerve. At the cardiac end of this nerve is a second centre. The heart rate cut off from its nervous mechanism is much faster than normal; therefore, the main action of the nervous mechanism connected with the heart is to inhibit or slow its rate. Any drug that stimulates either one of these centres decreases the heart rate, because their function is inhibitory; while if they are depressed the normal inhibitory action is removed from the heart, and its rate is increased.

The sympathetic nervous system is also connected with the heart and possibly contains certain accelerator fibres whose function is to increase cardiac rate; but these fibres are normally inactive and cannot be depressed, although in rare instances they may be stimulated by drugs, and the heart rate quickened. (The heart rate may also be increased by increasing the irritability of the heart muscle.)

The vasomotor mechanism controls the calibre of the blood vessels. It consists for our purposes of the vasomotor centre, the vasoconstrictor nerves and nerve endings in the course of the blood

vessels, and their muscular walls. Any drug, therefore, that stimulates the vasomotor centre constricts the blood vessels, any drug that depresses it dilates them, and any drug that stimulates the vessel wall or nerve endings again constricts the blood vessels, or if it depresses them they dilate. Thus we speak of peripheral or central vasoconstrictors or dilators. The normal blood pressure is dependent upon the work of the heart and the size of the blood vessels. The work of the heart may be influenced either through its nervous mechanism, which modifies its rate, or by an action directly on the heart muscle, which influences mainly the force of each contraction.

The blood pressure first may be **raised** by a contraction of the blood vessels, produced by stimulation of the vasomotor centre or the blood vessel walls; by increased work of the heart, produced by stimulation of each beat, or by increasing its rate, the force of each beat remaining the same. This increased rate may be caused by depression of the pneumogastric centre, peripherally or centrally, or by stimulation of the accelerator fibres, or by increasing muscular irritability. Second, it may be **lowered** by a dilatation of the blood vessels or by depression of the heart muscle itself, thus lessening the work of each beat, or by a decrease in the cardiac rate, produced by stimulating the pneumogastric centrally or peripherally.

Gastro-intestinal Tract.—Drugs may influence the gastro-intestinal tract, either through its nervous mechanism, namely, the splanchnics, or by a local action on the mucous membrane. The splanchnic mechanism, like the pneumogastric, is inhibitory; therefore, anything which stimulates the splanchnics, either centrally in the lower portion of the cord or peripherally in the wall of the intestine, tends to lessen peristalsis. Locally, if a substance is irritant it tends to increase the secretion of the gastric and intestinal ferments and also to increase the peristalsis. On the other hand, if it be sedative, the reverse is true. Certain substances, as we shall see later, influence the function of the intestines by altering osmotic pressure.

The above are the main physiological points which we should keep in mind when studying the physiological action of drugs; in most cases we shall be able to reason out the symptoms of poisoning and also our therapeutic application from this physio-

logical knowledge. We shall find, however, certain exceptions to this, mainly because our knowledge of the physiological action of drugs is imperfect, and we therefore do not know why they produce certain symptoms, and the same is true with therapeutic application. We are compelled at present to make purely empirical use of certain remedial agents; that is, having found them valuable in certain diseases in a large number of cases, we use them for these conditions without definite knowledge as to how they act. Further, when we think of drugs in connection with the human being we must keep in mind certain facts: that the substances we use are usually foreign to the body, that many of them are toxic, and that the power of drugs to do good is distinctly limited. Save in specific instances, drugs either stimulate or depress function, and if an organ be so diseased that it cannot respond to such stimulation or depression the drug can be of no value. Though it is sometimes doubtful whether the remedy does good, it is never doubtful that in overdose it may do a great deal of harm. In disease due to bacterial infection we are commonly dealing with a toxin which in itself is a poison, and when we use drugs we are adding another form of poison to the one already existing. This may be of value to the patient under the correct circumstances, but the point is that we must keep in mind the harmful action of drugs as well as their value in the treatment of disease. Moreover, our knowledge of the physiological action of drugs is based largely upon animal experimentation. We must, however, remember that most of this work has been done on normal animals and that in therapeutics we are dealing with sick human beings; next, that the nervous system even of the higher animals differs distinctly in complexity from that of man, and the same is true to a lesser degree of the other systems of the body; for instance, a dog will stand a dose of morphine much larger than that for a man if the dosage is given according to body weight. This is due to the fact that morphine attacks most readily very specialized tissue, and the brain of a man being more highly specialized than that of a dog a much smaller dose is required to produce the same effect. Further, the action of morphine on the spinal cord of many of the lower animals is much more pronounced than on that of man, because where the brain is simple the spinal cord is usually complex, therefore more

easily affected by morphine. In the horse, for instance, morphine produces great excitement; in the rabbit, convulsions. We have an explanation for this difference in the greater complexity of the system of man than that of animals, but this does not change the fact that these differences exist, and we must take them carefully into account when deducing results from animal experimentation, which are to be used for the benefit of the human being.

DOSAGE.

We are now ready to take up certain general considerations in regard to the direct application of drugs to disease, and we must first consider dosage. Unfortunately, there are no definite rules for dosage that can be followed without exceptions. Most of the poisonous fluid extracts are given in doses of one to three minims, the poisonous tinctures in five to ten minims, and the infusions in one dram to half an ounce. The dose of a drug given in the U. S. Pharmacopœia or National Formulary, which are our two official standards, is the dose for an adult, given by the mouth. The most accurate method for determining the dose for a child is to take the weight of a normal adult man (150 pounds) as the standard. The dose for a child is that fraction of the adult dose which is obtained by dividing the child's weight by 150 pounds. Thus, the dose of Ext. Rham. Pursh. is one grain. If we wish to give this drug to a child weighing 50 pounds the dose would be $50 \div 150$, or one-third, and the dose for the child would therefore be one-third of a grain. A method in more common use is that known as **Young's rule** for dosage, namely: use the age of the child as the numerator of a fraction, with the age plus twelve as the denominator. For instance, if the child is two years of age, then the fraction would be two divided by two plus twelve, or two-fourteenths, or one-seventh. If we take, again, the adult dose of digitalis as one grain, then the dose for a child of two years is one-seventh of a grain.

Cowling's rule follows more accurately the weight line, as will be seen by the accompanying diagram.

Take the age at the next birthday, and divide it by twenty-four; thus in a child of seven years the age at the next birthday is eight, eight divided by twenty-four equals eight-twenty-fourths

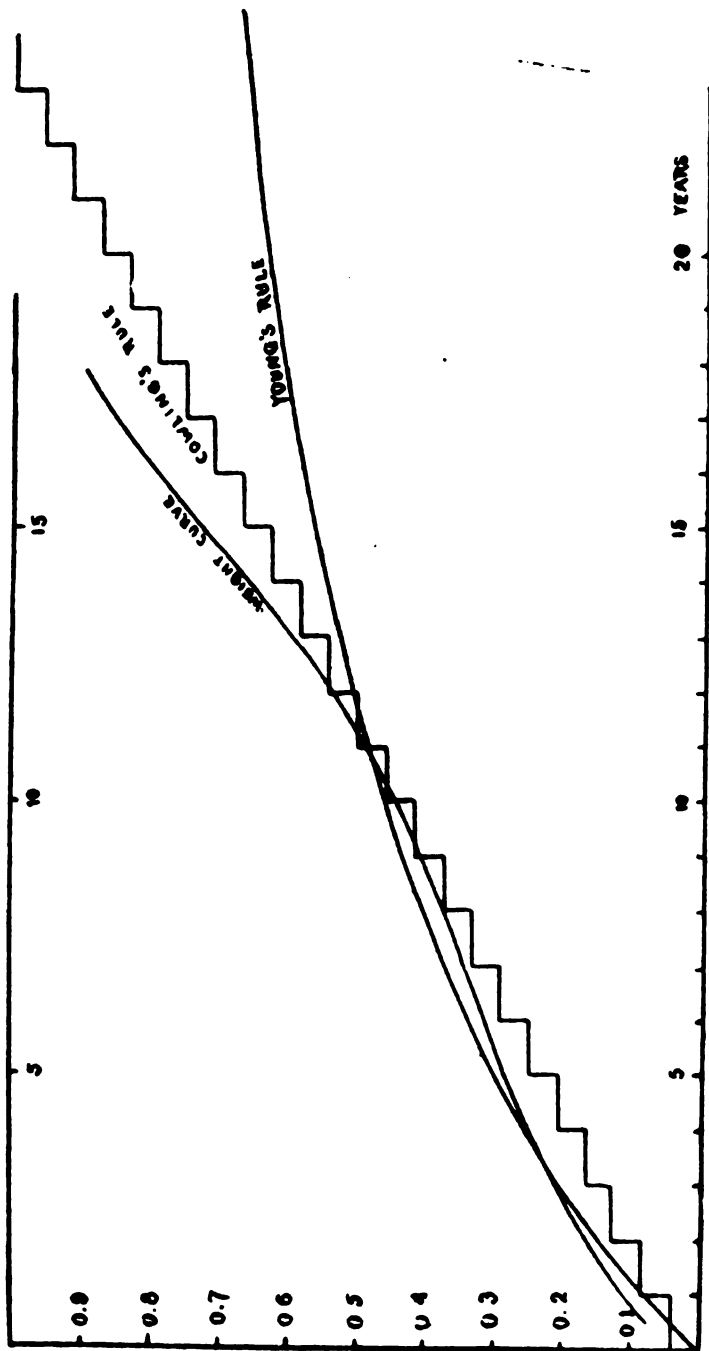


Fig. 2.
Diagram showing methods for determining dosage.

or one-third; therefore, we will take one-third of the adult dose for a child at the age of seven. In adults, as a rule, it must be remembered that small people take relatively smaller doses than larger ones, save that in extremely fat people the dose had better not be increased over the ordinary adult dose. In children less than one year of age the weight is a particularly important guide.

A baby at the age of five months weighs approximately fifteen pounds.

Young children bear opium badly, and it should be given in extremely small doses. On the other hand, children bear relatively large doses of iron, calomel, antitoxin, and belladonna.

MODES OF ADMINISTRATION.

First.—BY MOUTH.—The most common and convenient mode.

Disadvantages.—1. Slowness of absorption. 2. Modification of the substances before reaching the blood. 3. Taste.

Second.—BY HYPODERMIC INJECTION.—The dose is about one-half of that by mouth.

Advantages.—1. Rapidity of absorption. 2. The substance reaches the blood unchanged.

Disadvantages.—1. Painful. 2. Complicated. 3. Danger of infection. 4. Must be non-irritant and soluble.

Third.—INTRAVENOUSLY.—The dose is one-fourth that by mouth.

Advantages.—Immediate absorption.

Disadvantages.—1. Only soluble substances can be used. 2. They must not be too irritant. 3. It is a comparatively dangerous method.

Fourth.—BY INUNCTION.

Advantages.—Continuous, slow absorption.

Disadvantages.—1. Practically only applicable with substances soluble or contained in a fatty medium. 2. Very slow, and very inaccurate as to amount absorbed.

Fifth.—BY INHALATION.

Advantages.—Very rapid.

Disadvantages.—1. Only applicable to volatile substances, usually very fugacious. 2. Likely to be irritant to the lungs.

Sixth.—PER RECTUM.

Advantages.—1. Slow absorption. 2. No danger of gastric irritation.

Disadvantages.—1. The rectum is an eliminative and not an absorptive structure. 2. The dose required is twice that by mouth. 3. It must usually be administered in a fatty medium.

TIME OF ADMINISTRATION OF DRUGS.

This is dependent on their rate of absorption and elimination. If a drug is very rapidly absorbed and rapidly eliminated and we wish to get its continuous action we must give it frequently; for instance, nitroglycerine every two hours. On the other hand, a drug like the bromides, which is somewhat slowly eliminated, is often not given more than twice a day. If we wish the direct action of a drug upon the mucous membrane of the stomach it is given when this organ is empty. If the substance is likely to disturb the stomach it is usually given after the meal, that it may be diluted by the food. If we wish to affect the intestinal tract it is customary to give the drug two hours after eating.

PRESCRIPTION WRITING.

Measures.

APOTHECARY'S MEASURE.

60 minims (m.), 1 fluid dram (fʒ).

8 drams, 1 fluid ounce (fʒ).

16 fluid ounces, 1 pint.

SOLID MEASURE.

60 grains (gr.), 1 dram (ʒ).

8 drams, 1 ounce (ʒ).

12 ounces, 1 pound.

1 fluid dram equals 60 minims. Liquid measure.

1 fluid ounce equals 8 fluid drams, which equals 480 minims.

1 dram equals 60 grains. Solid measure.

1 ounce equals 8 drams, which equal 480 grains.

DOMESTIC MEASURE.—This is the standard in common use, but it must be remembered that it is inaccurate, and when using very toxic substances in concentrated form it cannot be depended upon. Particularly is this true of drops, which differ in size, according to the liquid and the character of the vessel out of which they are dropped. Generally speaking, however,

- 1 drop is equal to $\frac{1}{2}$ minim.
- 1 teaspoonful is equal to 1 fluid dram.
- 1 dessertspoonful is equal to 2 fluid drams.
- 1 tablespoonful is equal to 4 fluid drams or $\frac{1}{2}$ ounce.
- 1 wineglassful is equal to 2 fluid ounces.

In writing a prescription the first thing to be done is to write the name of the patient and the date.

Second.—To write the sign *R*, an abbreviation of *recipe*, take.

Third.—The ingredients to be used.

Fourth.—The abbreviation *M*, meaning *misce*, or mix, and the Latin word *et*, meaning and, with the instruction to dispense, according to what form we are using; or, if it is only to be mixed, as in a liquid prescription, we would simply add *M. et Sig.*, meaning write on the label, a teaspoonful three times a day or whatever direction we wish to give.

Fifth.—Decide upon the total amount of medicine to be dispensed.

Sixth.—Bring the vehicle up to that amount, preceding it by *q. s.*, *quantum sufficiat*, to the amount of.

Seventh.—Find the total number of doses which the prescription will contain, and multiply the individual dose of each ingredient by that number, and place the result opposite the name of each substance.

Note:—These names should be either the full pharmacopœial names written in the genitive case or, as is more common, abbreviated. Now, let us translate the above rules into a concrete example.

We will take first the simplest form of a prescription, namely, a liquid. We are not at present discussing why we use these particular drugs. This we shall take up after we have considered the physiological action. The following is simply to illustrate the form of writing. We wish to prescribe for

Mr. Smith.

Date,

R Tr. Nucis Vom., fʒss.

Tr. Capsici, fʒil.

Tr. Gent. Comp., q. s. ad fʒiil.

M. Sig.—One teaspoonful three times a day before meals in water.

Dr.

In the above the first, second and third rules are apparent. In following the fourth rule we have decided to give a liquid prescription, we have directed the druggist to mix it (misce) and to sign it (sig); that is, to write on the label as above.

Fifth Rule.—We decide that the total amount of medicine we will use to be three ounces.

Sixth Rule.—We bring the vehicle, which is here the last substance mentioned, namely, the tincture of gent. comp., up to three ounces by using the expression, q. s. The druggist will first mix the amounts of the other substances ordered, and then add enough tincture of gentian to make the whole mixture three ounces.

Seventh Rule.—We are going to give a teaspoonful or one dram at a dose, the total amount in the bottle is three ounces, there are eight drams to an ounce, three times eight are twenty-four, therefore we must have twenty-four doses. The dose of nux vomica which we wish to give is ten min, which, multiplied by twenty-four equal 240 mins., and since there are sixty mins. in a dram this equals four drams, and since there are eight drams in an ounce, it equals one-half ounce. Therefore we will place opposite the tr. nucis vom., f̄ss.

Of the tr. capsici. we have decided to give five mins. at a dose. Multiplying five mins. by twenty-four our total number of doses gives us 120 mins., which equal two drams, there being sixty mins. in a dram.

The Form of a Pill.

Mr. Smith.

℞ Strych. Sulph., gr. ss.
Ex. Bella., gr. iiii.
Aloini, gr. xii.
M. et div. in. pil. No. xxiv.
Sig:—One at night.

Date

Dr.

The Form of a Capsule.

Mr. Smith.

℞ Phenol. Salicyl., gr. xlviii.
Acetphenetidini, gr. xxiv.
Caffeinæ, gr. xxiv.
M. et Dispensa. in Caps. No. xxiv.
Sig:—One three times a day after meals.

Date

Dr.

For the pill the first five rules are followed in exactly the same way as above. The sixth rule, however, is here not used, because the physician does not decide on the vehicle of a pill, but leaves that to the pharmacist. The seventh rule is again the same as we used in the first prescription. We are going to give twenty-four pills. We will give one forty-eighth of a grain of strychnine, therefore we will have in all twenty-four forty-eighths or one-half of a grain. We will give one-eighth of a grain of extract of belladonna, and will therefore have twenty-four eighths or three grains. We will give one-half grain of aloin, and will therefore have twenty-four halves or twelve grains.

A pill should not contain over five grains or it will be too large to be conveniently swallowed.

In the capsule form, however, we instruct the druggist to mix and dispense in twenty-four capsules. We wish to give two grains of phenol salicyl., and twice twenty-four is forty-eight grains, the total amount. We will give one grain of acetphenetidine, which gives us twenty-four grains in the total and one grain of caffeine, giving us again twenty-four grains.

The amount in a capsule depends a good deal upon the form of the substance, its weight, and how easily it packs, ten grains being about the maximum.

The Form of a Suppository.

Mr. Smith.

Date

℞ Ex. Bellad., gr. iii.
Iodoforml, gr. xxiv.
Gland. Suprarenal. Sicc., gr. xii.
Ol. Theobromatis, q. s.

M. et fac suppos. No. 12.

Sig:—One at night.

Dr.

Here we follow exactly the same rules already mentioned, save that we always use as the menstruum the oil of theobroma, because this melts at the body temperature. The amount, however, of this substance is again not decided by the doctor, but by the pharmacist. He will take enough of it to fill his suppository mould. We will give of the extract of belladonna one-fourth of a grain, which will give us in the twelve suppositories a total of three grains. We will give two grains of iodoform, or a total of twenty-four grains,

and one grain of suprarenal, which will give us in the total twelve grains. A suppository should not contain over five grains.

The Form of an Ointment.

Mr. Smith.

Date

℞ Acid. Boric, gr. xx.
Resorcin, gr. x.
Hydrargyri Chloridi Mitis, gr. xx.
Petrolati, q. s. ad. ℥i.

M. et Ft. Ung.

Sig:—Use Externally.

Dr.

In writing for an ointment we consider what strength of the preparation we want to use, usually in the form of percentages, and we remember, roughly speaking, that five grains to the ounce equal 1 per cent.

The Form of an Emulsion.

Mr. Smith.

Date

℞ Creosoti, m. xlviii.
Ol. Gaultheriæ, f℥ii.
Acaciæ, q. s.
Aquæ, q. s. ad f℥iii.

M. et Ft. emulsio.

Sig:—One teaspoonful in water three times a day after meals.

Dr.

An emulsion is written exactly as was our first liquid prescription, save that we use acacia to emulsify the substances which we wish to dispense, because they are not sufficiently soluble in water. The amount of the acacia, however, we again leave to the druggist, because he will know how much to use to make a smooth emulsion. Our vehicle being water, we bring it up as before to three ounces, and since a teaspoonful, or one dram, is to be taken at a dose, we must have twenty-four doses in the total, and we will give two minims of creosote, giving us, therefore, forty-eight minims, and five minims of the oil of gaultheria, giving us 120 minims, or two drams.

The amounts of the drugs in prescription are always written in Roman numerals; a few abbreviations in common use which should be remembered are as follows:

Fiat—Ft.—Let it be made.

Fac—F.—Make.

Misce—M.—Mix.

Signa—Sig.—Label.

Div.—Divide.

Solve—Dissolve.

Ana.—aa.—Of each.

Et—And.

In—Into.

Ter in die—t. i. d.—Three times a day.

Post cibum—P. c.—After food.

Ante cibum—A. c.—Before food.

Q. s. ad—Enough for.

Aq. dest.—Distilled water.

Semis—ss.—One half.

Pro re nata—P. r. n.—Occasionally as needed.

METRIC SYSTEM.

This system is always used in scientific and laboratory work, and is slowly coming into use among practising physicians in America. The main difficulty is the learning of a new set of doses. But familiarity with the following facts will make the conversion from apothecaries' measure to the metric system comparatively easy.

The gramme is the weight of a cubic centimetre (Cc.) of distilled water at 4° C., 39.2° F., and is the unit of solid measure. The decigramme is equal to 1/10 of a gramme. The centigramme equals 1/100 of a gramme. Above the gramme we have the decagramme, equalling 10 grammes, and the hectogramme, equalling 100 grammes. For liquids we use the cubic centimeter (Cc.), which represents one fluid gramme.

0.065 gramme or 65 milligrammes, equal 1 grain.

1 gramme or 1 Cc., equals 15 grains or 15 minims.

3.888 grammes are equal to 60 grains or 1 dram.

31.1 grammes are equal to 480 grains, or 1 ounce.

The following prescription in apothecaries' measure should be converted into the metric system, thus:

℞ Strychnæ Sulphatis, gr. ¼.

Tr. Belladonnæ, fʒss.

Elix. Aromatic, q. s., ad fʒiii.

Sig:—One fluid dram 3 times a day after food.

Since ¼ of a grain equals ¼ of 0.065, or 0.0162 gramme, we will have strychnæ sulphatis 0.0162 gramme. One-half of a

fluid ounce equals four fluid drams, and one fluid dram equals about four grammes (Cc.), so that four fluid drams equal 4×4 grammes, or 16 grammes; therefore tincture of belladonna will be 16 grammes, or 16 Cc. One fluid ounce equals 31.1 grammes, hence three fluid ounces equal 3×31.1 grammes, or 93.3 grammes; therefore elixir aromatic will be 93.3 grammes, and the complete prescription will read as follows (in the metric system prescription, the decimal point is represented by a vertical line):

	Gm.
R Strychniæ Sulphatis,	0.0162.
Tr. Belladonnæ,	16
Elix. Aromaticus, q. s., ad.	93.3.

Sig:—Four Cc. three times a day after food.

INCOMPATIBILITIES.

There are a very large number of incompatibilities. We will give only a few general rules which will cover the most important ones.

There are three kinds of incompatibilities.

(a) *Chemical*, the combination of two substances such as an acid and an alkali, that make a new compound,—sodium bicarbonate and hydrochloric acid.

(b) *Pharmaceutical*, where the combination makes an inelegant-looking mixture, such as ichthyol and petrolatum, which separate.

(c) *Physiological*, where two substances have opposing physiological action, such as digitalis stimulating the heart, aconite depressing it. The latter we shall understand more fully after we have considered the physiological action of drugs. It is mainly the first class, the **chemical**, with which we have at present to deal.

1. Substances containing tannic acid are incompatible with substances containing iron in solution, and produce a black precipitate of the tannate of iron, which is the composition of ink.
2. If strongly alcoholic preparations of vegetable substances are diluted with water the resinous substances are likely to be thrown out of solution.
3. The alkaloids are precipitated by tannic acid or bromides. The salts of the alkaloids are thrown out of solution by the alkalies and neutral bases.
4. Acids and alkalies are incompatible.
5. The essential oils are soluble in water only to the extent of one minim to the ounce.
6. Fixed oils cannot be prescribed in

water unless in the form of an emulsion. 7. Arsenic is incompatible in solution with iron. 8. Iodine and the iodides are incompatible with preparations of iron and the alkaloids. 9. Silver nitrate is practically incompatible with everything except the extract of opium and the extract of hyoscyamus. 10. Any form of mercury is converted by the iodides into its most poisonous form, red iodide. 11. Acacia cannot be used for an emulsion if the solution contains alcohol. 12. Alkalies and very strong acids destroy the action of pepsin. 13. Potassium chlorate should not be rubbed up with tannic acid or any other oxidizing agent, as the mixture will explode. 14. Chlorate of potassium and ammonium chloride may ignite. 15. Iodides should not be mixed with alkaloids. 16. Cherry-laurel mixed with morphine may form the poisonous cyanide of morphine. 17. Sweet spirits of nitre and antipyrin are incompatible. 18. Aromatic waters cannot be used in preparing saturated solutions of drugs.¹

Definitions of the important pharmacopœal preparations:

Tinctures are liquid preparations of drugs ranging in strength from 5 to 50 per cent. in alcohol more or less dilute.

Solutions are non-volatile substances dissolved in water.

Fluid extracts are alcoholic preparations of drugs of such a strength that one minim equals one grain of the crude drug.

Infusions are watery extracts of crude drugs made with boiling water.

An *alkaloid* is a crystalline vegetable principle capable of forming salts with acids.

A *glucoside* is a body containing glucose with some organic principle.

Oleoresins are mixtures of volatile oils and resins.

A *resin* is a vegetable exudate, soluble in alcohol, ether, and volatile oils, and insoluble in water. A gum-resin differs from a true resin only in containing some gum capable of softening in water.

Cerates are unctuous preparations made with wax, spermaceti, or resin, and having a firmer consistency than an ointment, so that they do not melt at the temperature of the body.

Solid extracts are made by evaporating aqueous or alcoholic solutions to solid or semi-solid masses.

¹The modern tendency in prescription writing is toward extreme simplicity, thus avoiding many of the old incompatibles.

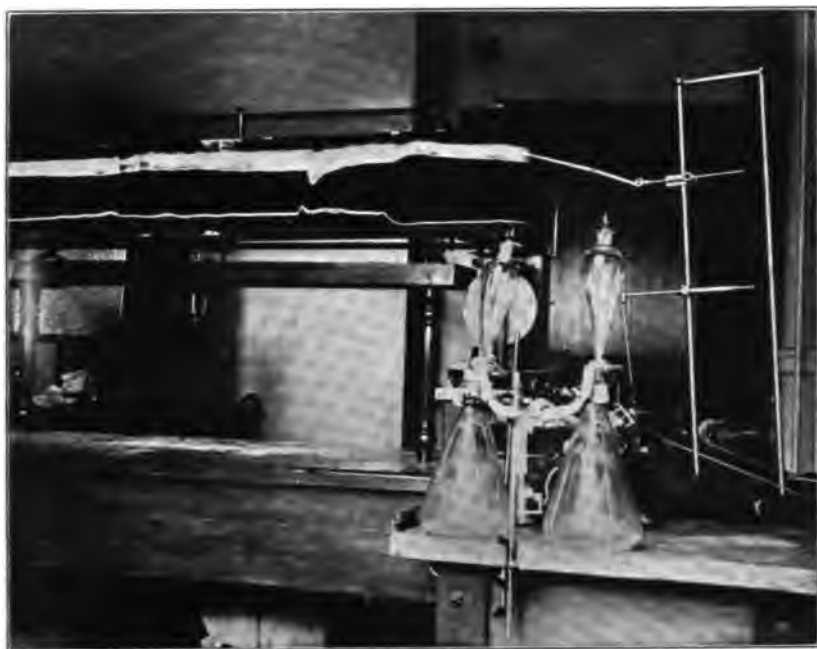


Fig. 3.

Showing apparatus for taking combined blood-pressure and cardiographic record (Cushny). The levers of the cardiograph are sutured to the ventricles. The downstroke on the record represents systole. The blood-pressure was recorded with a U-shaped mercurial manometer which has been removed. During the experiment artificial respiration is maintained. (From Laboratory, University of Pennsylvania.—Author's photograph.)

CHAPTER II.

DRUGS USED TO PRODUCE ANÆSTHESIA.

(THE ANÆSTHETICS.)

NITROUS OXIDE.

This is given by inhalation.

Brain.—It depresses; first, by cutting off the supply of oxygen to the cells of the cortex; second, by acting directly upon these cells as a depressant.

Circulation.—Nitrous oxide produces no direct effect upon the circulation, but, by the cutting off of oxygen, it causes an accumulation of carbon dioxide in the blood, this latter substance markedly stimulates the vasomotor centre, and produces, therefore, a great rise in blood pressure. This accumulation of CO_2 also stimulates the respiration and, because of the CO_2 and the failure to get oxygen, the blood becomes cyanotic.

Toxicology.

When nitrous oxide is inhaled it first produces marked mental excitement, which is soon followed by unconsciousness; the respiration becomes rapid, often irregular, and the skin cyanotic; the reflexes are little affected; the pulse is rapid, full and strong. Stopping of the nitrous oxide is followed by almost immediate return to consciousness.

Therapeutic Application.

Nitrous oxide is practically used only by inhalation to produce general anæsthesia. It is sometimes given combined with enough oxygen to support life, thus making it possible to use it for more or less prolonged operations. The apparatus for the purpose is, however, cumbersome and only practicable for hospital use; furthermore, the patients always become more or less cyanosed, no matter how carefully the nitrous oxide and oxygen are given. If the patient by chance gets a few whiffs of air he instantly returns to consciousness; the surgeon, too, is at a disadvantage

with this anæsthesia because it does not produce as complete relaxation as ether. Its use is, therefore, fairly well limited to minor operative procedures, which require little time, such as opening an abscess or pulling a tooth. It is said to be the safest of all anæsthetics. It is somewhat dangerous to use it if the blood vessels are sclerotic, because the high blood pressure produced by the drug may cause rupture. The advantages of it are, however, that the patient very quickly recovers and usually without any gastrointestinal disturbance. It must be remembered that during the entire anæsthesia some individuals have delusions and dreams, usually unpleasant. The substance is used a great deal now by the surgeon to precede ether, thus avoiding the symptoms of local irritation which the latter at first produces.

ETHER.

Physiological Action.

Local.—Ether is locally irritant, antiseptic, and, because of its rapid evaporation, cooling.

Brain.—It produces marked depression, preceded by a short period of excitement. According to the most widely accepted theory, anæsthesia is produced by the dissolving of the lipoid, or fatty, substances in the brain cells, and the general rule has been formulated that the strength of an anæsthetic is in direct proportion to its power to dissolve the lipoids; hence chloroform is stronger than ether.

Pupil.—It has no direct action upon the pupil, but indirectly, late in the poisoning, in the condition of shock, the pupil dilates.

Secretion.—Because of its tendency to dilate the peripheral blood vessels, ether produces sweating.

Reflex Arc.—Ether depresses the entire reflex arc; first the sensory ganglion, then the sensory nerve, the motor ganglion, and the motor nerve.

Respiration.—Depressant from beginning to end.

Circulation.—Stimulates the heart muscle and slightly increases its rate by depressing the vagus. Depresses the vasomotor centre, and dilates the blood vessels.

Body Temperature.—Tends to lower body temperature by

DESCRIPTION OF COMBINED CARDIOGRAPH AND BLOOD-PRESSURE APPARATUS.

The animal, usually a dog, is first completely anesthetized with ether. A cannula is then inserted in the femoral artery. This cannula is connected with a U-shaped mercurial manometer (H), the writing needle of which is in contact with the smoked paper on the cimographian, the needle being attached to a small float which rides on the surface of the mercury. The rubber tubing which connects the cannula with the manometer, and the cannula itself, are filled with a potassium citrate solution to prevent the blood from clotting. While the cannula is being inserted into the artery clamps are placed on the latter to prevent hemorrhage. The proximal one is removed when the blood-pressure tracing is to be made. The cardiograph (Cushny) consists of an iron stand (A) with an upright steel frame (BB) to which is clamped a rod (C) having at its far end a ball and socket joint (E). Into this is fitted another rod (D), having at its lower end a small eyelet (Y). Clamped to this rod is a short cross-piece (F), and to the latter another rod hinged at (G). The smaller hinged rod has also an eyelet (X). From the upper end of rod (G) a thread runs through a pulley at (M), then up to the writing lever (N), which is held up by a spiral spring (O).

When the blood-pressure apparatus has been arranged as described above, the thorax of the animal is rapidly opened in the median line, and artificial respiration through a trachea tube started, and maintained throughout the experiment. The pericardium is opened, and stitched to either side of the chest wall. The cardiograph is now brought into position, and the two levers are sutured to the sides of the right ventricle by passing ligatures through the eyelets (X and Y). It is clear that as the ventricle contracts the lever with the eyelet (X) will be drawn toward (Y), and as this lever is hinged at (G) its upper end will move outward, thus making a pull on the thread, and so draw down the writing lever (N); therefore, the downstroke will represent the heart's systole, the upstroke—tension being maintained by the spring (O)—will represent diastole.

The drugs are administered intravenously. The two large bottles shown in the photograph are for the purpose of administering ether or chloroform by inhalation at will during the artificial respiration. The blood-pressure manometer is not shown in the photograph (Fig. 3), but its tracing can be seen. The drum of the cimographian is revolved by clock-work, the time being indicated by an electrical second marker (K). In the combined tracings of the text, the upper line represents the heart's action, the middle the pressure, and the lower the time in seconds.



(For description see opposite page.)

increasing heat radiation, because the blood vessels dilate and more blood is brought to the skin.

Kidney.—Irritant.

Elimination.—By the lung, kidney, and slightly by the skin.

The Stage of Ether Narcosis.

First Stage.—*Excitement.*—The patient becomes delirious. The pupil is usually dilated, due to fear. The skin becomes red and moist and warm. The reflexes are little affected, the drug having not as yet reached the centres. The respiration is irregular and sometimes stops altogether. These phenomena are due to the local irritant action of the drug on the lungs; the irritation also causes a tendency to spasm of the larynx. The pulse is usually very rapid, full and strong. The body temperature may be slightly subnormal.

Second Stage.—*Anæsthesia; Mental Condition.*—Patient is unconscious and anæsthetic, due to direct cerebral depression. Pupil is semi-dilated and responds to light. Skin is still warm, moist and red. The reflexes due to the entire depression of the reflex arc are markedly lessened. Respiration is slowed. Pulse is still slightly increased in rate and of full volume. Body temperature is slightly sub-normal. As the patient recovers slowly from the anæsthesia the irritant action of the drug upon the stomach often causes vomiting. The urine is of rather high specific gravity and may contain a trace of albumen. The body temperature remains subnormal for some hours.

Third Stage.—*Collapse.*—If the anæsthesia is pushed too hard or given for too long a period muscular relaxation, which is complete in the second stage, has added to it the loss of muscle tone. The breathing becomes stertorous or noisy. The pupil becomes dilated and loses its light reflex. The skin becomes cold, pale and cyanosed. Reflexes are abolished. The respiration may cease altogether, owing to complete paralysis of the respiratory centre. The pulse becomes rapid and weak, due to a secondary depression of the heart. The body temperature markedly falls, and the patient dies, usually of respiratory failure, sometimes of cardiac.

Management of Ether Narcosis.

Prophylaxis.—The most effectual treatment of ether collapse is prevention; namely, the proper administration of the anæsthetic. First, the lips of the patient should be moistened with a little vaseline. Second, carefully look for any false teeth or other foreign substances in the mouth, and if present remove them. Third, make a careful examination of heart, lungs and urine preceding anæsthesia, sugar being probably an absolute contra-indication, while marked nephritis adds to the danger. Fourth, the best method is the open one, the drug being given with plenty of air. Several thicknesses of gauze are made into a pad large enough to cover the patient's face, he is placed in a comfortably relaxed position, the gauze over his face, and the anæsthetizer makes a few quieting suggestions to him, then begins by dropping the ether very slowly on the gauze. An excellent trick is to have the patient count one, two, three, and so forth; this takes his attention off the procedure, and makes him inhale the anæsthetic more rapidly. If the patient now stops breathing and becomes rather cyanotic, the anæsthesia should not be stopped, because this is due to reflex spasm of the larynx, and when anæsthesia of the mucous membrane is produced it will cease. The ether is now continued drop by drop and slow, steady breathing and relaxation will soon indicate the beginning of the second stage, which is the operative stage. The loss of the conjunctival reflex, which is a fairly good indication of the beginning of this stage, had best be elicited, not by putting the finger directly on the conjunctiva, as this is likely to produce a conjunctivitis, but by pressure on the eyelid instead.

The most important rule to follow is to give just as little ether as is possible to keep the patient in the second stage and to watch most carefully the pulse and respiration. A very skilful anæsthetist will be able to keep the light pupillary reflexes present during the entire time of administration.

The pulse can be taken at the temporal artery or in the carotid; the jaw should be held forward at the angles, the mouth kept clear of mucus, and the tongue brought out should it happen to fall back.

If, in spite of these precautions, the pulse becomes suddenly

rapid or the character of the respiration changes, or cynosis appears, the anæsthetic should be immediately stopped. If the heart is markedly failing the head of the patient should be lowered so as to carry the blood of the great veins of the abdomen to the right heart and thus stimulate the circulation. The patient should not be kept long in this position. Artificial respiration is here useful, as well as in respiratory failure, because the act mechanically stimulates the heart as well as promotes elimination through the lungs.

In performing the Sylvester method of artificial respiration twenty times a minute is sufficient. The mouth should be open and the tongue forward. Both arms are adducted from the body forcibly so as to raise the chest wall.

It is believed by some investigators that this method does not force sufficient air into the lungs to support life, and they maintain that to lay the patient flat on the abdomen, turn the head to one side, straddle the body, and make forcible pressure twenty times a minute on the base of the chest is more effective.

In the treatment of ether shock the following drugs are of value, always given hypodermically: Strychnine sulphate, grain one-thirtieth, because it stimulates the vasomotor centre, the respiratory centre and the entire motor cord; caffeine sodium benzoate, two grains, because it stimulates the brain, the vasomotor centre and the heart; inhalations of oxygen, because they probably help to supply oxygen to the blood when there is cyanosis; atropine sulphate, because it is a general stimulant, particularly to the heart, respiration and vasomotor centre; adrenaline chloride in a one one-thousandth solution, 5 minims of which may be given intravenously, because it is a very powerful vasomotor stimulant; alcohol should be absolutely avoided, its physiological action being almost identical with that of ether; digitalis and strophanthus are not particularly useful here because, though powerful cardiac stimulants, they are comparatively slow in action, and, given hypodermically, are likely to produce abscess. Artificial heat should always be applied to counteract the fall of body temperature.

As has been said, a patient coming out of ether under ordinary conditions is very likely to vomit before he is perfectly conscious. This may lead to inspiration pneumonia, small particles of food and mucus getting into the lungs and setting up an infection. It

is well, therefore, to empty the stomach preceding the anæsthesia, also to flush the intestinal tract by a saline cathartic, but a patient who is kept purging all of the night before an operation is weak and depleted when he comes to the table, so some very eminent surgeons use only one-half an ounce of oleum ricini (castor oil) the night before the operation, which purges once freely in the morning.

Other Medical Uses of Ether.—Because ether is locally irritant and also stimulant to the heart it is sometimes used as a carminative; that is, a drug which aids in the expulsion of flatus in cases of flatulant gastro-enteritis. It is most effective in elderly people where the distention of the stomach produces pressure on the heart with some embarrassment of its action and symptoms resembling angina pectoris (pseudo-angina).

Ether has been used to relieve convulsions, and is here of some value since it depresses the brain and cord, but its local action is so irritant that chloroform is better for this purpose.

Preparations:

Spiritus ætheris, 15 min. to 1 dram.

Spiritus ætheris compositus (Hoffmann's anodyne), containing ether, alcohol and ethereal oil, $\frac{1}{2}$ to 1 dram.

Late or Secondary Effects of Ether.—Ether is sometimes responsible for lighting up a latent tuberculosis, and because of its irritant action upon the kidneys it may be the beginning of chronic Bright's disease. Sometimes the gastro-intestinal disturbances continue for a long time after the anæsthesia. Next to nitrous oxide, ether is the safest anæsthetic, being about five times as safe as chloroform.

CHLOROFORM.

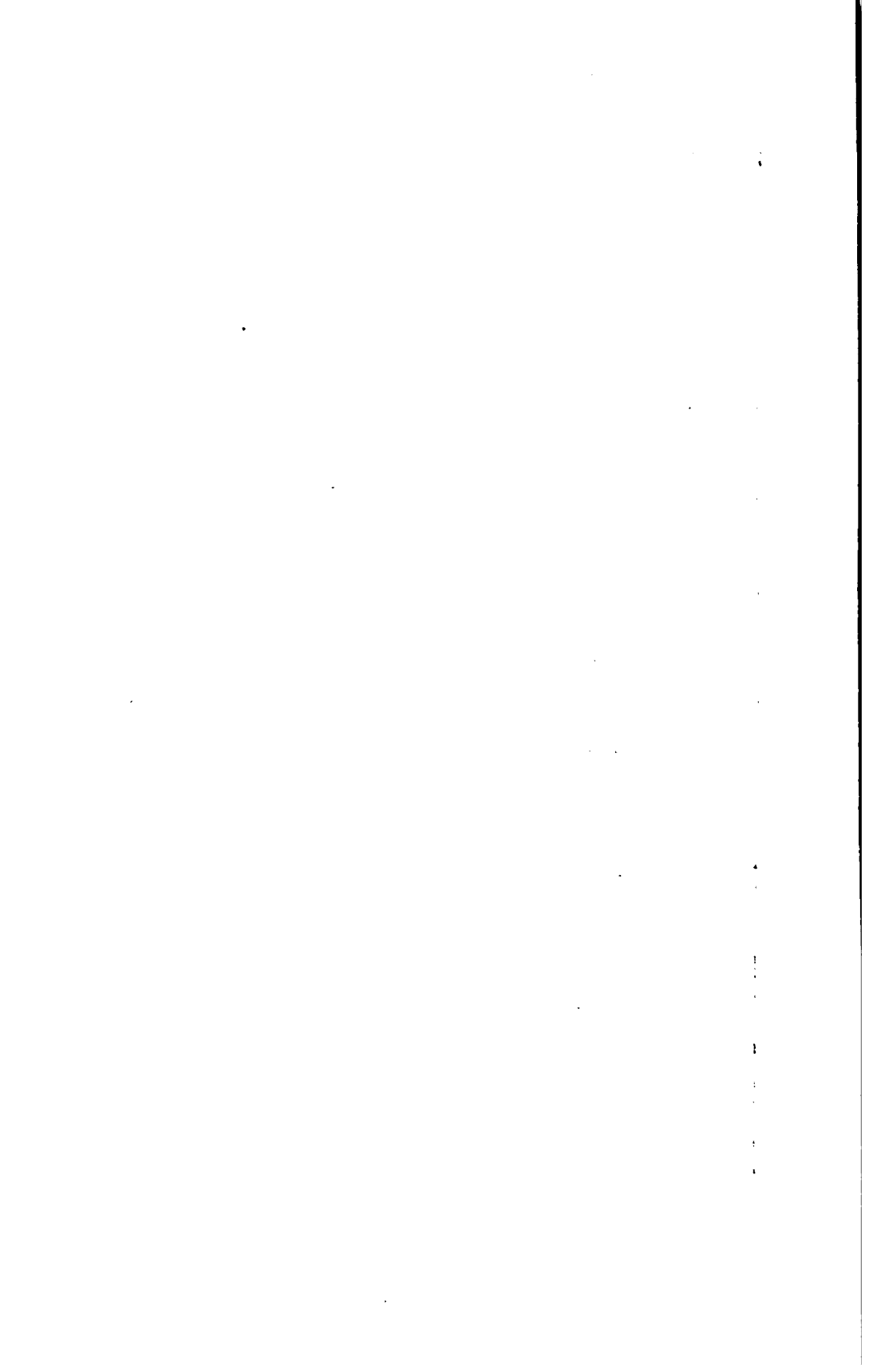
The physiological action of chloroform is almost identical with that of ether, the differences being as follows: Ether is a cardiac stimulant from the start. Chloroform is a cardiac depressant. Chloroform is a much more irritant substance, bulk for bulk, than ether; but because so much less of it than of ether is required to produce anæsthesia it is given must more freely diluted with air, therefore is less irritant to the lungs.

Chloroform has the following *advantages* over ether:



Fig. 5.

Combined cardiographic (downstroke, systole) and blood-pressure tracing showing the depressant action of chloroform. White space indicates where drug was injected. A, represents zero pressure and time marked in seconds; B, blood-pressure taken from artery; and C, heart's action, the downstroke systolic, the upstroke diastolic. The general arrangement for making these tracings is shown in Figs. 3 and 4. (Courtesy, A. N. Richards, Pharmacological Laboratory, University of Pennsylvania.)



1. There is little or no preliminary stage of excitement. 2. It is much more agreeable to take. 3. It is more rapid. 4. It requires less bulk to be carried around. 5. The recovery from it is usually without nausea.

Disadvantages.—1. It is five times more dangerous than ether. 2. It is a powerful heart depressant. 3. It is more irritant to the kidneys. 4. It sometimes produces wide-spread fatty degeneration, acetonemia and death. Therefore, if you are compelled to anæsthetize in cases of heart or kidney disease, your preference should be given to ether.

If there is any disease of the lungs or respiratory tract, chloroform is preferable.

Other Uses of Chloroform.—It is used internally as a carminative and externally as a liniment.

For internal use the following combination is often used:

℞ Spts. Chloroformi, fʒss.
Tr. Opil, fʒii.
Elix. Aromat., q. s. ad fʒiii.

M. et Sig:—One teaspoonful every fifteen minutes for 3 doses.

Such a combination is valuable for abdominal pain due to distension of the bowels.

For external use the linimentum chloroformi, containing 30 per cent. chloroform in soap liniment, is a powerful counter-irritant, useful in muscular pains, pleurisy, and sometimes in gastric pain as a palliative measure. It is likely to blister, however, after which it must be discontinued. We would write:

℞ Linimenti Chloroformi, fʒiii.
Sig:—Used externally.

There are also the official aqua chloroformi, the dose of which is one dram, and the emulsio chloroformi, the dose of which is one dram.

CHAPTER III.

DRUGS USED AS LOCAL ANÆSTHETICS.

ETHYL BROMIDE.

(Not Official.)

The local action of this substance is distinctly irritant, and because of its great volatility it rapidly freezes the skin, producing anæsthesia. When inhaled, it also produces general anæsthesia by depressing the brain, at the same time depressing the heart muscle. There is at present much discussion as to the danger of this drug as a general anæsthetic. Some surgeons are using it preceding ether, also to produce anæsthesia during painful dressing of wounds. There have, however, been several cases of sudden cardiac failure during its use. As a local anæsthetic for the opening of an abscess it is valuable. If any dissecting is to be done, however, it interferes with this by hardening the tissue. While the part is freezing it is distinctly painful, and the freezing of the already necrotic area tends to increase the amount of slough.

ETHYL CHLORIDE.

(Not Official.)

This is used in much the same manner.

COCAINE.

This drug is commonly classed among the so-called delirifacients, but it is largely used in practical medicine as a local anæsthetic and is therefore classified under this head.

Cocaine is an alkaloid obtained from the leaves of *erythroxylon coca*. Locally it depresses the peripheral sensory nerves, producing local anæsthesia; to the brain it is a distinct stimulant; the pupil is dilated, probably from peripheral stimulation of the sympathetic.

Upon secretion it has very little influence. **Reflex arc;** it stimulates the motor ganglion. **Respiration;** it stimulates. **Circulation;** it stimulates the heart, increasing the rate by peripheral depression of the pneumogastric; it also stimulates the vasomotor centre, constricting the blood vessels.

Elimination is largely by the kidney, to which it is slightly irritant.

Toxicology.

Gastro-intestinal Tract.—No vomiting, as a rule, because it is a local anæsthetic.

Mental Condition.—The patient is excited and often delirious.

Pupil is dilated.

Skin.—Not much affected.

Reflexes.—Increased, and there may be general convulsions.

Respiration.—Increased in rate and *often* in depth.

Pulse.—Full and strong; later, when the secondary depression of the drug sets in, the pulse may become weak.

Death.—Usually results from secondary paralysis of the respiratory centre; that is, the respiration is stimulated by the drug until the centre is worn out and fails to respond to stimulation. An important thing to remember is that the drug does not produce general anæsthesia. Death occurs from respiratory failure before the drug is sufficiently concentrated in the blood to depress the sensory nerves. This takes place only when it is applied locally in concentrated form.¹

Treatment of Cocaine Poisoning.

Cocaine poisoning is seldom produced by taking the drug into the stomach. It usually occurs from local use to produce anæsthesia, followed by general absorption. Therefore, it is of no moment to empty the stomach unless, as in rare instances, it has been taken in this way. If so its antidote, twenty to thirty grains of tannic acid in warm water, should be given at once. Peripheral emetics, that is, emetics acting on the membrane of the stomach, will be likely to fail because anæsthesia of this organ has been produced. A hypodermic of apomorphine, one-eighth of a grain, may be given, or, better, the stomach washed out with tannic acid solution through a stomach tube. Since this drug is a general stimulant, depressants are here indicated; the bromides and chloral, the former in twenty-grain, the latter in ten-grain dose, repeated in an hour if required, are effective, mainly because they are both depressants to the spinal cord and the brain, and over-

¹Cocaine at times produces primary profound shock. This is probably due to inadvertent introduction into a vein.

come the hyper-excitability. Cocaine poisoning is usually not fatal, and is of short duration. It commonly occurs through the local use of the drug by injection into the tonsils preceding their removal, or into the urethra preceding the passage of a sound.

Therapeutic Application.

Preparations.—*Fluidextractum cocæ*, dose one dram; *vinum cocæ*, dose one dram. These preparations are for internal medication for general tonic effect, and should be used with great caution, particularly in chronic cases, as will be shown later. The alkaloid cocaineum hydrochloridum, is given in a dose of one-quarter of a grain. Oleatum cocaini, 5 per cent., is used in ointments. In hypodermic use we should not give in a single injection more than one-half of a grain.

Adrenalin chloride, an unofficial preparation of the active principle of the suprarenal glands, in a one to one-thousand solution, is sometimes combined with cocaine to help in anæsthesia, and also to constrict the blood vessels and lessen bleeding. For hypodermic use we might write: Cocaine hydrochloride, gr. iss.; adrenalin chloride, f3 ss.; aqua dest., f3 ii.

The average hypodermic syringe holds about twenty to twenty-five minims; therefore, the solution should be so made that the required dose will be in twenty minims. We therefore bring our aqua up to two fluid drams, which will give us six doses, five minims of adrenalin chloride at a dose will give us half a dram of adrenalin chloride, and one-quarter of a grain of cocaine at a dose will give us $1\frac{1}{2}$ grains of cocaine. In using this drug either alone or combined as above with adrenalin chloride it is well if possible to isolate the part; that is, if it be a finger, to put a ligature above the point of injection. Cocaine is not absorbed through the skin but is readily absorbed through the mucous membrane, so that if applied to the nose, for instance, it may be used directly on a cotton swab. To make an incision without pain the entire contents of the hypodermic syringe should not be injected in one spot, but in a line of small injections; in this way the same effect is produced with less of the drug. Both cocaine and adrenalin markedly constrict the blood vessels, and this is followed by secondary paralysis; sometimes, therefore after the use of these

drugs as local anæsthetics there is secondary hemorrhage. This may be seen after the removal of the tonsils. Many think that these drugs tend to cause sloughing of wounds.

Cocaine and its preparations, as above mentioned, are used sometimes as anti-emetics, that is, to prevent vomiting, by locally depressing the peripheral nerves of the stomach. This is done only in extreme cases and is effective only when the vomiting is due to some local irritation.

Cocaine might be a very useful tonic because of its general stimulating action, but it is rarely that its use is justifiable, owing to the likelihood of producing the cocaine habit.

Cocaine Habit.

This most commonly results from taking the drug to relieve the local symptoms of hay fever or rose cold, which it will do very effectively by contracting the inflamed turbinates and rendering them anæsthetic. The patient gets into the habit of snuffing the solution into the nostrils to secure its pleasant stimulating effect. The symptoms of the cocaine habit are very indefinite; the pupils are often dilated, the patient is extremely neurotic, and, possibly most characteristic of all, is the absolute loss of his moral sense. He becomes irresponsible, having no regard whatever for the truth, either as to the use of the drug or anything else. In bad cases the only successful treatment is to have the patient watched by a trustworthy person, to stop the drug, to keep the bowels well flushed out, by using large quantities of water and by saline cathartics, and to meet the symptoms of each case. If the individual is profoundly depressed, strychnine sulphate in a dose of one-thirtieth of a grain three times a day is often valuable. On the other hand, if there be great insomnia trional, in doses of ten grains at night, and other hypnotics may be used, of which we will speak later.

EUCAINE.

In solution of twenty to forty grains to the ounce this may be applied to the nose and throat; it is less toxic than cocaine.

TROPACOCAINE.

A 3 to 10 per cent. solution in 0.85 per cent. solution of sodium chloride has the advantage of not being decomposed by heat, consequently it may be boiled. It is a preparation generally used for spinal anæsthesia—that is, the solution is injected into the spinal canal between the third and fourth lumbar vertebræ after having first withdrawn the same amount of cerebrospinal fluid as is to be injected. It will produce anæsthesia as high up as the gall-bladder, but is particularly indicated in operations below the umbilicus. It is not yet proven to be a safe method of anæsthesia, but in certain cases of severe lung disease or disease of the kidney, or in some cases of shock where a general anæsthetic is contra-indicated, it may prove justifiable.

CHAPTER IV.

DRUGS USED MAINLY TO PRODUCE SLEEP.

(HYPNOTICS.)

CHLORAL HYDRATE.

Physiological Action.

The local action of chloral is anæsthetic, depressing the peripheral nerves.

On the brain it is a powerful depressant.

The pupil, no direct effect; but if the patient is in shock produced by the drug the pupil dilates.

Secretion, no direct effect.

On the reflex arc it is a marked depressant, particularly to the motor ganglion of the spinal cord.

Respiration, powerful depressant.

Circulation, particularly depressant to the cardiac muscle; at first slowing the heart rate by stimulating slightly the central end of the vagus (unimportant); second, depressing the vaso-motor centre; thus, chloral causes a marked fall in blood pressure.

Special Action.

Chloral after prolonged use seems to affect *metabolism* and tends to cause fatty degeneration. The drug is *eliminated* by the kidneys, largely in the form of urochloralic acid. It is very rapidly absorbed, and more slowly eliminated. Chloral produces a fall of *temperature* by depressing the thermogenic centre, but the fall is also largely due to depressed circulation.

Toxicology.

Chloral rarely produces gastro-intestinal disturbances, because it is a local anæsthetic.

Mental Symptoms.—Profound sleep.

Pupil.—Usually dilated.

Skin.—Moist and warm early; later cold.

Reflexes.—Markedly lessened.

Respiration.—Slow and shallow.

Pulse.—At first slow, later becoming rapid, but always weak ; fall of body *temperature*.

Treatment of Chloral Poisoning.

There is no efficient chemical antidote for chloral ; and the substance is so rapidly absorbed that, even if the antidote did exist and were given immediately it would have little effect. The stomach should be washed by means of a stomach tube, or an emetic may be given ; zinc sulphate, thirty grains, or powdered ipecacuanha, fifteen to thirty grains, or apomorphine hypodermically, one-tenth of a grain. Support the body temperature by external heat, and if respiration fails it should be continued artificially. Owing to the heart weakness the patient must be kept absolutely at rest in bed. Keep him awake, if possible, so that he may breathe of his own volition. Since the cause of death is either respiratory or cardiac, our treatment must be directed to stimulate these functions. Strychnine here is a very useful drug, being a good example of physiological antagonism, stimulating particularly the cord, vasomotor centre and respiration, all of which, as has been said, chloral depresses. Strychnine sulphate should be given in doses of one-thirtieth of a grain hypodermically, and may be repeated every hour until there is some indication of heightened reflexes, when it should be stopped.

Digitalis, ten drops of the tincture by mouth, is helpful but slow. The same is true of tincture of **strophanthus**. These two drugs act mainly by stimulating the cardiac muscle ; they are not, however, suited to hypodermic use. **Caffeine** given in the form of citrated caffeine, five grains by mouth, or caffeine sodium benzoate, three grains hypodermically, is helpful here because it stimulates the brain, the heart, the vasomotor centre and the respiration. **Atropine sulphate**, one one-hundredth of a grain, may also be used, this drug, too, stimulating the heart, vasomotor centre, respiration and brain. The reason why so many drugs form a possible treatment of a poison like this is because stimulation by different drugs will often help more than increasing doses of a single drug, each drug acting upon the centre in a slightly different way.

We have given the treatment of chloral poisoning thus in detail because we shall continually refer to it, as it represents a type of treatment that would be indicated in poisoning by any drug that produces cardiac, vasomotor and respiratory failure. In individual cases we may use the chemical antidotes, and at other times special measures, which will be noted, but the same general line of treatment holds good for all.

Therapeutic Application.

Chloral hydrate is freely soluble in water, therefore, is usually given in aqueous solution. The dose is ten to twenty grains. Its effect upon the brain is sometimes aided by combining it with the bromides, thus:

R Chloral Hydrat., ʒss .
Sodii Bromid., ʒi .
Aq. Menth. Pip., q. s. ad ʒʒiij .

M. et S.:—One teaspoonful, repeated in 3 hours, if required.

Thus we have a prescription containing ten grains of chloral hydrate and twenty grains of sodium bromide to the dose. To guard against the action of the drug upon the circulation and yet secure its action upon the brain, it is sometimes well to combine it with strychnine, thus:

R Chloral Hydrat., ʒss .
Strych. Sulph., gr. ss.
Aq., q. s. ad ʒʒiij .

M. et S.:—One teaspoonful at night.

This gives us ten grains of chloral and one forty-eighth of strychnine sulphate at a dose. Digitalis would here be useful to overcome the heart-depressant action of chloral, but, unfortunately, it is too slow. The only way to use it rationally is to give ten drops of the tincture of digitalis an hour or two preceding the chloral. Manufacturing chemists have made many attempts to modify this drug so as to prevent its depressing action on the heart, while keeping its hypnotic effects, but have been only partially successful.

Some of the chemical derivatives of chloral are as follows, none of them being such active hypnotics as chloral itself:

Chloralformamide, dose fifteen grains in solution or capsule.

Croton chloral hydrate, dose fifteen grains. **Chloretone**, ten grains in capsule, rather insoluble in water, slow in action, irritant to the stomach. **Chloralose**, dose ten grains.

Chloral liquifies when combined with an equal quantity of camphor, carbolic acid, menthol or thymol, and the combination, particularly chloral and camphor, is used by some as a counter-irritant to relieve pain.

Therapeutic Indications and Contra-Indications.

The most common use of chloral is to produce sleep, and it is particularly useful in insomnia not due to pain, which it has little power to relieve.

In delirium tremens, in nervous insomnia, in insomnia due to toxæmia, it is an effective remedy, reducing the mental excitement.

In **convulsions** of spinal origin, such as strychnine poisoning, in tetanus or in convulsions of cerebral origin, as in the status epilepticus where the epileptic attacks are so frequent that they threaten life, chloral is a useful drug, as will be apparent when we recall its physiological action. Locally chloral is valuable in ointments to relieve itching or superficial pain. Let it be remembered that in using chloral in convulsions it is in no sense a specific for the disease, but simply depresses the over-excited nervous system. The great contra-indication to its use is weakness of the circulation, particularly of the heart muscle.

OPIUM.

Local Action.—Irritant.

Brain.—Powerful depressant.

Pupil.—Contracts by a central action.

Secretions.—Decreases all with the exception of that of the skin, which it increases.

Reflex Arc.—Little influence in man, but in the lower animals it often increases the reflexes, the spinal cord being more highly developed than it is in man, and being first stimulated by the drug.

Respiration.—Powerfully depressant.

Circulation.—Slight stimulant to the heart muscle, increas-

ing a little the force of the heart, but markedly decreasing its rate by stimulating the vagus, both peripherally and centrally. This slowing is not direct, but is due to the increased amount of CO_2 in the blood because of the respiratory depression.

Special Action.—Opium in physiological dose decreases peristalsis by stimulating the splanchnics, also lessens the intestinal secretions, probably reduces slightly the amount of urine, and is eliminated mainly as morphine by the intestines.

Temperature.—In physiological dose produces little effect; in toxic dose, some fall.

Toxicology.

Gastro-intestinal Tract.—It may produce vomiting immediately; or, since it is to a marked degree eliminated through the gastro-intestinal tract and only slightly through the kidney nausea and vomiting may not occur for twenty-four hours. On the other hand, because of its depression of the vomiting centre in the medulla, sometimes soon after it is taken, it may be impossible to produce emesis, and the stomach tube must be used.

Mental Symptoms.—Profound sleep.

Pupil.—Contracted.

Skin.—Warm and moist.

Reflexes.—Little affected.

Respiration.—Slow and shallow.

Pulse.—Very slow.

Urine.—Small amount.

Temperature.—Subnormal.

The above is a description of the typical stage of opium poisoning, sometimes spoken of as the **second stage**. The **first stage** is seldom seen; it is characterized by mental excitement, as the drug momentarily produces stimulation of the brain. The **third stage** shows practically the same symptoms as the second, save that they are all intensified. There are, however, two differences; the skin becomes cold, clammy and cyanosed, due to the failure of respiration, and the pulse becomes rapid and thready, owing to the secondary paralysis of both the central and peripheral ends of the pneumogastric nerve.

Treatment of Opium Poisoning.

The stomach should be emptied, as already described. The antidote should be first administered, and it is the same for all alkaloids—tannic acid, twenty grains, in water. In treating the second stage the main thing is to keep the patient awake, and here we do not have the depressant action on the heart muscle as we did in chloral, so we may walk the man about. If this does not suffice he may be slapped with the end of a wet towel, or, if you have it at hand, use the faradic current attached to a brush of fine copper wire.

All the respiratory stimulants are here useful, caffeine, usually in the form of black coffee, a pint per rectum, or, as before mentioned, it may be given hypodermically in the form of caffeine sodium benzoate, two to five grains; atropine sulphate, in one one-hundredth of a grain dose; cocaine hydrochlorate, one-fourth of a grain; strychnine sulphate, one-thirtieth of a grain. These drugs may be given alternately every hour, always watching closely for their effects. Death is generally due to respiratory failure, and artificial respiration may therefore support life for hours while the drug is being slowly eliminated.

The Chief Preparations of Opium.

Opium depends for its physiological activity mainly upon the presence of the alkaloid, morphine. The sulphate is the salt generally used, the dose being one-fourth of a grain. It also contains codeine, used in the form of the sulphate, dose one-half grain. Two important synthetic preparations are made from morphine—heroin, one-twelfth of a grain, and apomorphine in the form of the hydrochlorate, one-tenth of a grain.

PREPARATIONS OF OPIUM ITSELF.

Pulv. opii, grain i. **Extractum opii**, grains three-quarters. **Tinctura opii**, min. ten. **Tinctura opii deodorati**, min. ten. **Tinctura opii. camphorata** (one-half ounce contains about one grain of opium), usual dose one dram. **Pulv. ipecacuanhæ et opii** contains one grain of opium, and one grain of ipecacuanha to eight grains of sugar of milk, dose, ten grains. (Dover's powder.) **Tinctura ipecacuanhæ et opii**, min. ten (liquid

Dover's powder). The above are the most important preparations used in practical medicine.

Heroin is unofficial, and is used mainly as a cough sedative. **Dover's powder** is chiefly given to produce sweating,—diaphoresis.

Apomorphine has no connection with opium or morphine physiologically, but is used exclusively to produce vomiting, and given hypodermically; this latter drug will be described under emetics.

The Therapeutic Applications of Morphine and Opium.

1. **To Produce Sleep.**—Opium is the most powerful drug known for this purpose, but generally it is the last to be thought of, unless specially called for, namely, in insomnia due to pain; when sleeplessness is due to other causes the less dangerous hypnotics are preferable.

2. **To Relieve Pain.**—Here opium is the most efficacious remedy, but it should never be used save when absolutely necessary, and is particularly to be avoided if the pain is periodical or chronic, because of the great danger of the opium habit. When shock is due to pain, morphia is the best stimulant.

The preparation to be preferred for this purpose and also to produce sleep is morphine sulphate, one-tenth to one-fourth of a grain either by mouth or hypodermically. It is better than the crude drug, opium, because it is a little more prompt in relieving pain; it is less likely to produce nausea next day; it is not so constipating, and it may be used hypodermically. It is the custom to guard morphine with the one-hundred-and-fiftieth of a grain of atropine sulphate to overcome the depressant action of the morphine on the respiration and on the heart rate; but it must be remembered that atropine diminishes the secretions of the body and also lessens peristalsis, thus magnifying two of the objectionable features of morphine; therefore, as routine treatment, this should be avoided. Strychnine sometimes works well with morphine to offset the depressant action on the respiration. The combination of one one-hundredth of a grain of nitroglycerin with the morphine seems to lessen the tendency of the drug to disturb the stomach next day. There is no rational explanation of this apparent truth. For hypodermic use tablets are

usually bought in the shops ready to be dissolved. It is well to be sure they are fresh and of a reliable make. If you wish to write a prescription for morphine and strychnine the form is as follows:

Morphinæ Sulphatis, gr. i.
Strychninæ Sulphatis, gr. $\frac{1}{6}$.
 Aq. dest. (boiled), q. s. f3ii.

This would give us one thirty-sixth of strychnine and one-sixth of morphine to each twenty minims; having 120 minims in the entire amount, and twenty being the dose, 120 minims will give us six doses. If the above is to be used hypodermically, the druggist must be directed to reboil the distilled water for safety, and to boil the bottle.

3. **To Control Diarrhœa.**—Here, again, opium is probably the most efficacious remedy, but it can do much harm if wrongly used. It acts by diminishing the secretion and lessening peristalsis; therefore, it helps to retain anything in the bowel. If the diarrhœa is due to some irritant, such as indigestible food, the opium will do harm by preventing nature from getting rid of it. The proper treatment here would be purgation, not opium. But, if, on the other hand, after the cause of the irritation is relieved, the diarrhœa persists from secondary relaxation of the bowel in subacute and chronic conditions, opium becomes our best remedy, though here also there are certain objections to its use—the possibility of the opium habit, and the fact that it is followed by distention of the bowels. In acute cholera morbus we are sometimes compelled to use opium or morphine, even though in a sense it be contra-indicated, simply to relieve the unbearable pain. In this case it should be immediately followed by a cathartic, commonly calomel in small doses. The most constipating preparation of opium and therefore the best for diarrhœa is *tr. opii camphoratæ*, dose 1 dram, given three times a day. We would write, then:

R *Tr. opii camphoratæ*, f3i.
 Sig:—One dram every 4 hours.

Opium is useful to relieve constipation only when this is due to a local spasm of the bowel, as is sometimes seen after operative procedures.

4. In the treatment of hemorrhage opium is valuable only

in internal hemorrhage—that is, hemorrhage that cannot be reached locally. It has no direct influence on either the coagulability of the blood or the lowering of the blood pressure, but indirectly it lessens the hemorrhage by quieting the patient. His nervousness and fear are dispelled by the sedative action on the brain. If the hemorrhage be from the lungs, it aids by slowing and quieting the respiration, thus giving the blood more opportunity to clot; and, if from the bowel, retards peristalsis and so lessens the hemorrhage. If the blood pressure be high it is rational to combine with the morphine nitroglycerin, for this dilates the blood vessels, and thus lessens blood pressure, and aids nature in her method of handling hemorrhages, which is by producing shock. For this purpose these drugs should, as a rule, always be administered hypodermically.

5. In the **Treatment of Cough**.—Here opium and its derivatives act mainly by depressing the respiratory centre. The drug is fairly effective in controlling cough if it is not accompanied by profuse expectoration, or if the cough is far in excess of the expectoration, because it quiets the irritation and breaks the habit of coughing. If, on the other hand, the cough is associated with free expectoration of mucopurulent material, then opium does great harm, because the cough is nature's method of getting rid of this toxic matter, and a cough sedative like opium causes the retention of this toxic material in the lungs, hence its systemic absorption, producing in the patient a more or less septic state. This evil result of the use of opium for cough is commonly seen in pulmonary tuberculosis.

To control cough, codeine, one-half of a grain, and heroin, one-twelfth of a grain, are most commonly employed, usually in pill. They may be combined with a little belladonna which aids by quieting the peripheral nerve-endings.

We would write, for instance:

R Codein. Sulph., gr. vi.
Ext. Belladonnæ, gr. ii.

Ft. in pil. No. 12.

Sig:—One three times a day as required.

This gives us one-sixth of a grain of ext. of belladonna and one-half of a grain of codeine sulphate.

Opium is also useful to relax the spasms of asthma, probably by

depressing the respiratory centre, but we cannot say definitely because our knowledge of the cause of essential asthma is as yet imperfect. It is usually given hypodermically, in a dose of one-quarter of a grain combined with one one-hundredth of a grain of nitroglycerin.

6. In **Diabetes Mellitus**.—Opium, or codeine, seems to be the only well-established drug that will lessen the amount of urine as well as the sugar. In this obscure disease it may be given in fairly large doses—a half grain of codeine three times a day. This drug, we think, is preferable to morphine, as it seems less likely to cause habit formation and is just as efficacious against the disease. Its use in this case is empirical, for we have little knowledge of its action. It is said by some that crude opium is the most effective of all the preparations for this condition.

7. **Irritation of the Bladder; Strangury**.—Here opium is temporarily beneficial simply because it reduces reflex irritation by lessening pain. Whether it has any local action here is doubtful.

8. In the **Treatment of Coryza**.—The one drug that is quite universally conceded to be of value in increasing the comfort of the patient in this common disease is opium. It is used for two purposes which are absolutely antagonistic to each other, namely; first, to increase, secondly, to decrease secretion. For the purpose of aborting a cold Dover's powder, pulvis ipecacuanhæ et opii, is given in ten-grain doses, most conveniently in two capsules, thus:

℞ Pulvis ipecac. et. opii, gr. x.
Ft. in cap. No. 2.
Sig:—Take at night.

The patient is usually directed to take a hot bath, then to swallow the two capsules and after these lemonade containing about an ounce of whiskey. The whiskey and opium can be combined for the patient by the druggist in the following way:

℞ Tincturæ Ipecacuanhæ et opii, m. x.
Sp. Frumenti, q. s. f℥.
Sig:—Take contents of bottle in a glass of hot water at night.

The patient may then be directed to put this preparation in a hot lemonade and take it. The purpose of this method of treatment is to abort a cold by the production of sweating, and it is sometimes helpful. Dover's powder, however, is not a powerful diaphoretic. Later, when coryza has reached the serous stage, with a great deal of exudate from the nose, opium helps to diminish the secretion in the nasopharynx, and also acts as a sedative, lessening the unpleasant paroxysms of sneezing. It had best be given in small oft-repeated doses, usually in the form of morphine, and combined with atropine, which is most useful in lessening secretion, also with camphor, which seems to be helpful, possibly by acting as a slight astrigent and supplementing the sedative action of the opium. We would write, then:

R Morphine Sulph., gr. i.
Atrop. Sulph., gr. $\frac{1}{16}$.
Camphor. Monobrom., gr. xxiv.

M. et Ft. in pill No. 24.

Sig:—One every half-hour until dryness of the throat is produced.

9. In the **Treatment of Peritonitis**.—This is a doubtful use of opium. It is valuable because it lessens irritation by reducing peristalsis, but it is harmful because it obscures the symptoms by completely relieving pain. It tends to increase distension and tympany of the abdomen, and it checks elimination. At present we think it may be said that the consensus of opinion is against its use.

10. In the **Treatment of Convulsions**.—Opium is of value only in the treatment of cerebral convulsions, for it has little effect upon the spinal cord. The value of opium in the treatment of uræmic convulsions has long been questioned because, though it controls the convulsion, its constipating action and the fact that it reduces the amount of urine tend toward the retention of the toxins; since, as we remember, the drug is largely eliminated by the intestinal tract and slightly by the kidneys. If, however, the convulsions themselves are threatening life, the use of the drug is justifiable if cautiously administered.

11. As a **Supporting Agent**.—Opium is here sometimes useful to relieve worry and severe nervous strain in the advancing

years of life, but it should never be employed for this purpose in young persons.

12. In **Heart Disease**.—If there is marked failure of the circulation, causing extreme dyspnoea, it is a well-known clinical fact that a hypodermic of morphine will give relief and permit the patient to get a night's sleep whereas he had before been kept awake trying to breathe, and thus relief is often produced by morphine after the well-known and much more powerful heart stimulants have failed. The cause for this is difficult to explain, as opium is not a powerful cardiac stimulant, on the one hand, and is a powerful depressant to respiration, on the other. The relief is possibly due to the action of the drug upon the brain, promoting quiet and sleep, therefore giving rest and relieving the irritation produced by the fact that the blood is not being sufficiently oxygenated. Whatever the explanation may be, the drug is useful for this purpose, but should be given most cautiously, particularly if there be cyanosis.

13. The **Local Use of Opium**.—Opium combined with lead water, an incompatible producing a marked precipitate, has long been used in the treatment of acute dermatitis, such as ivy poisoning, and also in the management of sprains. It may be applied hot or cold. Most pharmacologists think it is the lead and not the opium that has effect. The formula would read:

R Liq. Plumbi Sub cetatis, fʒiv.
Tr. Opii, fʒi.
Aq. q. s., fʒxvi.

M. et. Sig:—Use externally.

Or,

R Lotio Plumbi et Opii, N. F.
Sig:—Use externally.

The Opium Habit.

Opium is taken habitually in several forms. First, it is smoked. The extract of opium is used for this purpose, indulged in mostly by Chinamen, but is not uncommonly seen in the white race. We also have laudanum and paregoric drinkers, and, most important of all, morphine is used habitually by hypodermic.

Symptoms.—These people appear cachetic, are sallow, their pupils are contracted, the pulse rate is often slow, and they some-

times suffer from great constipation. They are extremely nervous and imaginative, their power of attention is poor, they have no regard for the truth. The marks of the hypodermic needle are sometimes found on the arms.

Treatment.—*First*, the patient must be put in the charge of an absolutely reliable person and watched continuously. *Second*, there must be rapid but not immediate withdrawal of the opium. *Third*, as the opium is withdrawn the gastro-intestinal disturbance and great insomnia must be treated. The latter must be managed by means of hypnotics, the great principle being to use a series of hypnotics alternately, so that the patient shall not become accustomed to any one. The intestinal tract is best treated by a light diet, usually milk; plenty of outdoor exercise; and by giving strychnine in doses of one-thirtieth of a grain three times a day, large quantities of water to aid in elimination, and a mild cathartic like fluid extract of cascara, twenty drops at night in water.

SULPHONAL (SULPHONMETHANUM).

Physiological Action.

This substance is rather slowly absorbed and slowly eliminated. It is a powerful depressant to the brain, a slight depressant to the circulation and respiration, and, when given repeatedly during a long period of time, destroys the hæmoglobin, and imparts a pink color to the urine.

Toxicology.

Sulphonal does not cause acute poisoning, but when taken each night for months is likely to produce insomnia, diarrhœa, sometimes constipated, incoördination of gait, areas of anæsthesia and paræsthesia, and later the pink discoloration of the urine already noted. The treatment is by elimination, croton oil (*Oleum tiglii*), minims two, in a teaspoonful of olive oil, being given at once. A high enema of at least a quart of water, then a hot pack and hot water by the mouth to increase sweating, subsequently saline purgatives, such as magnesium sulphate, drams four, in hot water, and the hypodermic injection of salt solution are all of value. It is said that the pink color in the urine makes the prognosis very grave. Sulphonal and trional

are commonly used by the laity, as the drugs can be easily obtained without prescription.

Therapeutic Uses.

The official name of this drug is sulphonmethanum; the dose is fifteen grains. It is best administered thus:

R Sulphonmethani, ʒii.

Ft. in pulv. No. xii.

Sig:—One in a glass of hot milk 2 hours before bedtime.

This drug is very slow in action, taking at least two hours, and sometimes longer. It is useful in nervous insomnia, and particularly when the patient is wakeful during the latter part of the night, because then, if taken at bedtime, it will begin to have its effect when most required. It often seems to last two nights, the patient being drowsy in the intervening day.

TRIONAL (SULPHONETHYLMETHANUM).

Physiological Action.

Identical with that of sulphonal, save that it is more rapidly absorbed, taking about twenty minutes to act, and it is less likely to produce chronic poisoning. Dose, fifteen grains. Official name sulphonethylmethanum. Written for in the same way as is sulphonal, and used for the same indication, save, as has been said, that it acts more quickly. It has largely taken the place of the former.

PARALDEHYDE.

This substance, so far as is known, acts only as a depressant to the brain. It is a powerful and useful hypnotic, but extremely unpleasant to the taste. It may be given in doses of thirty minims, administered in cracked ice. The **elixir paraldehyde, N. F.**, fifteen minims to the dram, is a preparation in which an attempt has been made to disguise the taste. We might write:

R Paraldehydi, fʒss.

Ol. Menthæ Piperitæ, m. ii.

Elix. Aromat., q. s., fʒlii.

M. et Sig:—A teaspoonful at night on cracked ice.

ÆTHYLIS CARBAMAS.

Urethane, a urea compound obtained by the action of ethyl alcohol upon urea; dose, fifteen grains in capsule; freely soluble in water; supposed to have little action on the circulation and to act mainly on the brain. It is a mild and rather uncertain hypnotic.

VERONAL (DIETHYLMALOXYLURIA).

(Not official.)

A substance closely allied to the above, and widely advertised; has little advantages over the official preparation, namely, æthylis carbamas, save that the dose is smaller. Veronal may be given in five-grain doses in capsules.

HYOSCYAMUS.

Contains two alkaloids, **hyoscyamine** and **hyoscine**. **Hyoscyamine** is little used in medicine. Its action is practically the same as atropine, of which we will speak later. **Hyoscine**, however, is strictly a hypnotic.

Physiological Action.

Cerebral depression is its most important action, but the drug has a striking peculiarity in that it sometimes, instead of producing sleep, excites delirium, and may markedly depress the respiration.

Therapeutics.

Hyoscine hydrobromate one two-hundredth of a grain, is usually given hypodermically; is especially valuable in the insomnia of alcoholism and of the acute infectious fevers, but, for the reason given above, must be used very cautiously. **Tincture of hyoscyamus**; dose, thirty minims; may be used for the same purpose as the alkaloid hyoscine, but is not so effective. The fumes of burned hyoscyamus leaves are valuable in the treatment of asthma.

CHAPTER V.

DRUGS THAT INFLUENCE CIRCULATION.

I. DRUGS THAT STIMULATE THE BLOOD VESSELS.

BELLADONNA.

Physiological Action.

Local Action.—Sedative, depressing probably both motor and sensory nerves.

Brain.—Stimulates.

Pupil.—Causes complete dilation, with loss of accommodation and light reflex. Peripheral in action, owing to paralysis of the oculomotor nerve.

Secretions.—Markedly decreasing all save the urine; especially lessens that of the skin and the saliva.

Reflex Arc.—In man little effect, save that when locally applied it depresses the motor and sensory nerves.

Respiration.—Powerful stimulant.

Circulation.—1. Stimulates the heart muscle. 2. Increases the heart rate by paralyzing the peripheral end of the pneumogastric. 3. Stimulates the vasomotor centre.

Special Action.—In small dose it lessens peristalsis, probably both by depressing the peripheral sensory nerve-endings in the intestine and also by stimulating the splanchnic centrally. But, better, it seems to act as a regulator of peristalsis, increasing it when it is less than normal, and checking it when excessive.

Body Temperature.—Causes a rise, probably due to lessened heat radiation.

Toxicology.

Gastro-intestinal Tract.—No definite symptoms.

Mental State.—Low, talkative delirium.

Pupil.—Widely dilated.

Skin.—Dry, hot, with a rash markedly resembling scarlet fever.

Reflexes.—Little affected.

Respiration.—Rapid and deep.

Pulse.—Rapid and strong.

Throat.—Dry.

Temperature.—Slightly elevated.

As belladonna is used a great deal for children, and is not uncommonly given in overdose, the differential diagnosis between poisoning by it and scarlet fever is important.

SCARLET FEVER.

Pupil slightly dilated.

Pulse and temperature proportionate.

Sore throat and enlarged lymphatics.

Delirium early, but rare.

BELLADONNA.

Pupil markedly dilated.

Pulse more rapid than the temperature would indicate.

Dry throat.

Delirium early, and common.

Treatment of Atropine Poisoning.

This condition is seldom fatal; it calls for the emptying of the stomach with an emetic, as already mentioned, the use of tannic acid as an antidote, and sodium bromide in full dose—thirty grains.

There are two drugs, of which we will speak more in detail later, that are physiologically antagonistic to atropine and belladonna and are sometimes used in the treatment of poisoning; namely, eserine salicylate, one-fiftieth of a grain, and pilocarpine hydrochlorate, one-twelfth of a grain.

Therapeutic Application.

Belladonna is commonly given in the form of tincture of belladonna, minims ten, or the extract of belladonna, one-eighth to one-quarter of a grain. The drug contains as its most important alkaloid atropine sulphate, dose one one-hundredth of a grain.

In the Treatment of Shock.—Atropine is particularly valuable because of its stimulant action upon the vasomotor centre

and the respiration. It must here be used guardedly, because it tends to increase the nervousness which often accompanies shock by stimulating the brain.

To Relieve Spasms.—Mainly because it seems to depress both the motor and sensory nerves. It is useful in many forms of reflex irritation, as in asthma, and is here best given by inhalation in the form of a powder burned with saltpetre:

℞ Stramonii.
Belladonnæ Foliorum.
Hyoscyami.
Potassii nitratis, aa ʒi.

M. et Sig:—Burn a half teaspoonful and inhale the fumes.

Hyoscyamus and stramonium have very much the same action as belladonna, but are slightly more sedative, and the combination seems to work better than a single drug. In the spasmodic croup of children, in whooping cough, and in the excessive cough of phthisis it is a useful remedy, also in the treatment of lead colic and in spasmodic dysmenorrhea due to spasms of the cervix. For inflamed hemorrhoids with spasm of the sphincter it is usually beneficial in ointment or suppository.

In the Treatment of Torticollis.—It is believed by some that atropine is here of value; it is best used hypodermically, injecting deeply into the substance of the muscle, thus depressing the motor nerve endings and relaxing the muscle.

In the **night urination of children**, it is valuable; it acts by lessening the reflexes of the bladder mucous membrane. It should be given in increasing doses until the condition is controlled or the therapeutic limit of the drug is produced; namely, dryness of the throat and slight dilatation of the pupil. Sometimes it fails completely.

To lessen the griping of cathartic remedies by reducing peristalsis, as before stated, a small dose, say one-eighth of a grain, of the extract of belladonna is commonly added to cathartic pills. It is generally combined with morphine when the pain is of a spasmodic character, as in renal or hepatic colic.

To Lessen Secretion.—Atropine is the most active substance we have. In the treatment of ptyalism or salivation atropine sulphate, one one-hundredth of a grain, may be given three times

a day until the limit is reached. It is said to be valuable both internally and locally in stopping the secretion of the maternal milk, used in the form of the official unguentum belladonnæ or the emplastrum belladonnæ.

In the treatment of the serous stage of *coryza* (see prescription under opium).

In the treatment of **Excessive Sweating**.—Here it acts by restoring the vasomotor tone. We might write:

℞ Atropinæ Sulph., gr. $\frac{1}{4}$.
Acid Sulphuric Aromatic, fʒss.
Aq., q. s. fʒiil.

M. Sig:—One teaspoonful at night.

This is one ninety-sixth of a grain of atropine sulphate and ten minims of aromatic sulphuric acid to the dose. This latter substance is, perhaps, slightly astringent and, therefore, aids somewhat the atropine.

In the treatment of **Gastric Hyperacidity**.—Atropine lessens the secretion of the entire gastro-intestinal tract. In excessive acidity of the stomach it may be given in pill in a dose of one one-hundredth of a grain half an hour after meals.

In the treatment of asthma we may combine belladonna and the nitrites, thus:

℞ Tinct. Belladonnæ, fʒil.
Sp. Glyc. Nitratis, m. xxiv.
Elix. Aromat., q. s. fʒiil.

Sig:—One teaspoonful every half-hour until dryness of the throat is produced.

During the attack it is sometimes more effectual to inhale the fumes of the leaves of belladonna, grouped as recommended by Hare, thus:

℞ Foli. Belladonnæ.
Fol. Stramonii, aa ʒi.
Pulvis Opil., gr. v.
Potassii Nitratis, ʒi.

M. et Sig:—A teaspoonful to be burned and inhaled.

This drug is contra-indicated in glaucoma, but the oculist uses it to dilate the pupil in conjunctivitis, keratitis, and other painful inflammations of the eye, using the following solution:

℞ Atropin Sulph., gr. i.
Aq. Dis., fʒil.

Sig:—One drop in each eye 3 times a day.

Homatropine hydrobromide, used mainly by the ophthalmologist in 1 per cent. solution to dilate the pupil; it is more rapid, more transient, and less toxic.

NUX VOMICA.

(Strychnine.)

Physiological Action.

Locally it is a marked bitter and irritant, and when taken into the stomach, therefore, increases the gastric secretion.

On the Brain.—Slightly stimulant to the special senses

Pupil.—No action.

Secretion of the gastro-intestinal tract is increased.

Reflex Arc.—Powerful stimulant to the motor side of the spinal cord.

Respiration.—Marked stimulant.

Circulation.—Vasomotor stimulant.

Heart.—A doubtful stimulant.

Elimination by the kidney as strychnic acid.

Toxicology.

Gastro-intestinal.—May cause vomiting.

Mental Symptoms.—Usually patient is conscious throughout.

Pupil.—Not much affected.

Skin.—No decided effect.

Reflexes.—General convulsions of spinal type are usually the first symptoms, often without any premonitory signs. These convulsions are caused by any slight sensory stimulus, like the slamming of a door or a draft of air.

Respiration.—During the convulsion the respiration is arrested in what is called cramped asphyxia; that is, the inspiratory and expiratory muscles, all being in spasm at the same moment, the chest becomes locked. The pulse is usually rapid and strong. The body temperature may be slightly elevated.

Treatment.—Do not attempt to empty the stomach or even to ask the patient to swallow anything, as this will probably cause a fatal convulsion; but give inhalations of amyl nitrite, which is a powerful depressant to the motor cord. Continue with chloro-

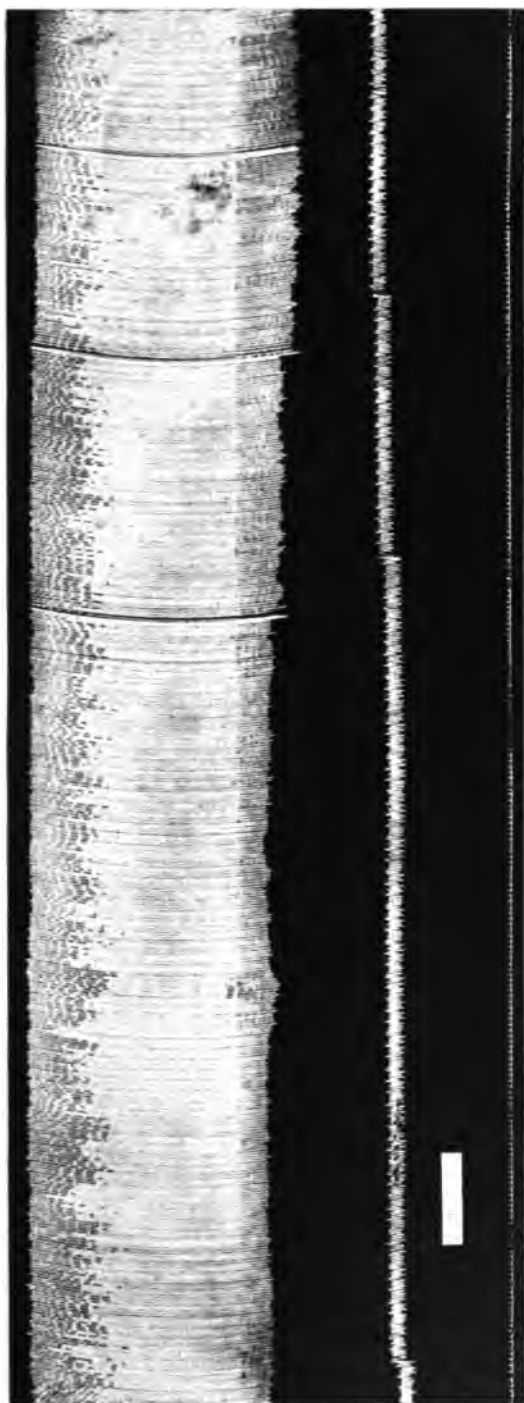


Fig. 6.

Combined cardiographic (downstroke, systole) and blood-pressure tracing showing slight action of strychnine. White space indicates where drug was injected. (For description of method see Figs. 3 and 4.) (Courtesy, A. N. Richards, Pharmacological Laboratory, University of Pennsylvania.)

form for the same reason, or use amyl nitrite hypodermically.
Give per rectum:

20 grains of sodium bromide.
10 grains of chloral hydrate in solution.

All of these measures tend to depress the motor and sensory areas of the spinal cord, which are over-excited. When the convulsions are controlled administer tannic acid in twenty or thirty-grain doses, and wash out the stomach. Strychnine is somewhat rapidly absorbed, but less quickly eliminated, hence its action is quite prolonged.

Therapeutic Uses.—Three preparations of this drug are in common use: Strychnine sulphate, the chief alkaloid of *nux vomica*; dose, one-thirtieth of a grain. Tincture of *nux vomica*; dose, ten minims. Extract of *nux vomica*, one-quarter of a grain.

In the treatment of **shock**.—Useful as a vasomotor, cardiac, and decided respiratory stimulant.

In the treatment of **paralysis**.—It has no effect upon the cause when there is destruction of the nerve cells, as in apoplexy; but when there is impairment of the function of the nervous system in chronic disease, it is of some value, stimulating the depressed centres; in acute inflammatory conditions of the spinal cord it is usually contra-indicated.

In **depressions of the nervous system** due to toxins or poisons, such as diphtheria, alcohol, lead, and tobacco, it is a very valuable remedy, and should be given in increasing doses until distinct increase of reflex is produced or the patient is evidently nervous, when the drug should be cut down. Especially is it valuable in the failure of vision associated with an excess of tobacco. It is a useful tonic in general debility, increasing the appetite by its local bitter action, promoting the secretions of the gastro-intestinal tract, stimulating all the functions of the body by acting on the entire motor cord, and of particular benefit in the relief of constipation. If there be slight anæmia, as there often is, it is well to combine the strychnine with iron. A prescription may be written:

R **Ferri Pyrophosphatis Solubilis**, ʒiij.
Strychninæ, Sulph. gr. ʒi.
Aq., q. s. fʒiij.

which gives us one forty-eighth of a grain of strychnine and five grains of the pyrophosphate of iron to the dose.

Sometimes the tincture of nux vomica alone, in increasing doses beginning with ten minims given a half hour before meals, will promote the appetite and overcome the general debility; but it should always be borne in mind that the cause must be found and, if possible, remedied.

In chronic alcoholics there is always so much fibrous tissue in the stomach that a very powerful bitter preparation is indicated, such as the following:

℞ Tinct. Nucis Vomicae, fʒss.
Tinct. Capsici, fʒii.
Tinct. Gent. Co., q. s. fʒiij.

Sig:—A teaspoonful half an hour before meals.

At other times, with a more chronic type of anæmia with loss of hæmoglobin, arsenic is undoubtedly helpful, and we may write for:

℞ Ferri Reducti, gr. xlviii.
Strych. Sulph., gr. ½.
Arseni Trioxidi, gr. i.

Ft. in Cap. No. 24.

Sig:—One three times a day after food.

This gives us 1/48 of a grain of strychnine, 1/24 of arsenic, and 2 grains of reduced iron.

CAFFEINE.

Local Action.—Irritant.

Brain.—Powerful stimulant to the highest centres.

Pupil.—Little effect; slight contraction.

Secretion.—No particular influence.

Reflex Arc.—Slightly stimulating to the spinal cord.

Respiration.—Markedly stimulating.

Circulation.—Stimulates the vasomotor centre; at first decreases but very soon increases the heart rate, probably by increasing the cardiac irritability, possibly by stimulating the accelerating fibres.

Kidney.—Late investigations seem to show that caffeine increases the amount of urine by dilating the blood vessels of the

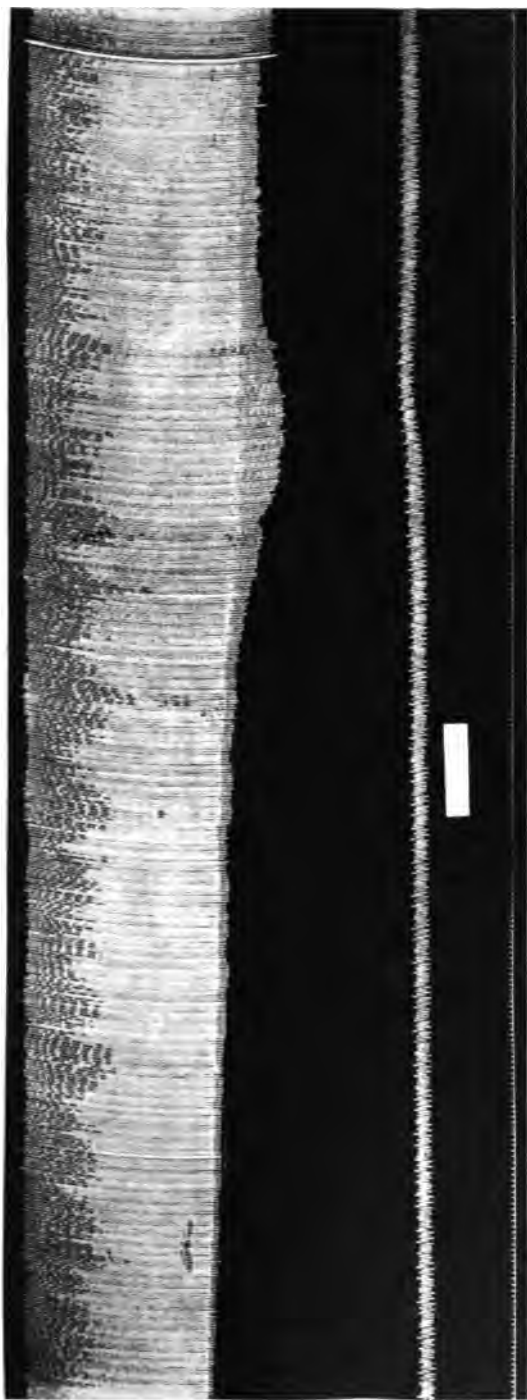
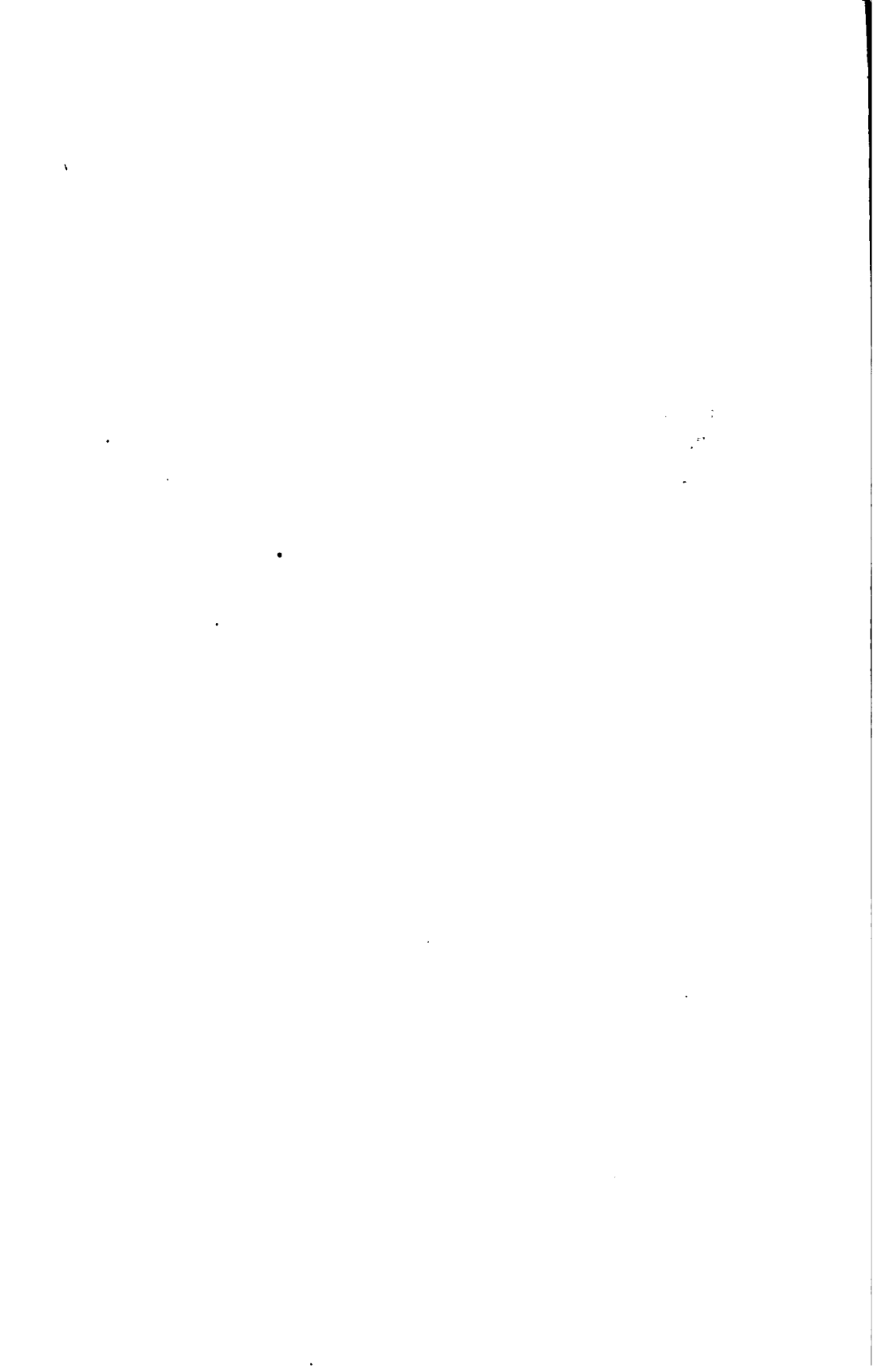


Fig. 7.

Combined cardiographic (downstroke, systole) and blood-pressure tracing showing the effect of caffeine. White space indicates where drug was injected. (For description of method see Figs. 3 and 4.) (Courtesy, A. N. Richards, Pharmacological Laboratory, University of Pennsylvania.)



kidney and not, as was formerly taught, by direct renal stimulation.

Temperature.—Not much affected.

Elimination.—Caffeine is absorbed with fair rapidity, but is rather slowly eliminated.

Toxicology.

Acute poisoning by this drug is rarely seen. When present, it produces gastro-intestinal irritation with vomiting.

Great mental excitement, with insomnia.

Pupil is slightly contracted.

Skin.—Not much affected.

Reflexes.—Slightly increased.

Muscles.—May be stiffened, as the drug is a muscle poison.

Respiration.—Full and deep.

Pulse.—At first somewhat slow, later becoming rapid and strong.

Urine.—Usually greatly increased in amount.

Death may be due to secondary paralysis of the heart or respiration.

Treatment of Caffeine Poisoning.

Antidote, tannic acid, to be given first of all, then an emetic to empty the stomach. Opium to quiet the brain. Chloral and the bromides, as before stated.

More or less chronic caffeine poisoning is, however, quite a common thing, particularly among certain classes of people,—society women who often drink tea and coffee to excess, the poor who take tea in place of food, and shop-girls who drink so-called tonic drinks at sodawater fountains, many of these preparations containing large amounts of caffeine.

These patients complain of constipation, great nervousness, insomnia, and headache. The treatment is to stop the source of caffeine.

Therapeutic Applications.

Preparations.—Caffeine itself; dose, one grain. Caffeine citrated, a mixture of equal parts of caffeine and citric acid,

soluble in about twenty parts of water; not a chemical compound. Caffeine sodium benzoate, N. F., three grains hypodermically in the treatment of shock, particularly when it is associated with marked stupor as we see it during the course of typhoid fever, due to profound toxæmia. Here caffeine is stimulating to the brain, vasomotor centre, and respiration, and slightly to the heart. It is contra-indicated in mental excitement. As a diuretic, it increases the amount of urine and aids in the elimination of dropsy, but is dangerous if the dropsy be of renal origin. If, however, the kidney be fairly healthy, as in dropsy due to cardiac or hepatic disease, caffeine is useful.

For some reason not well understood, caffeine is an effective drug in the treatment of headache, not relieving the cause, but simply the pain. Its effectiveness is often enhanced by combining it with acetphenetidinum (phenacetine), which also relieves pain, and with camphor, which in small dose is a sedative to the brain. We might therefore write:

R Acetphenetidini, gr. vi.
Camphor Monobrom., gr. xii.
Caffein., gr. vi.

Ft. in cap. No. 6.

Sig:—One every half hour for 3 doses unless relieved earlier.

It is to be remembered that both caffeine and phenacetine are powerful drugs, which should be given to patients with careful instructions not to continue them for a long period of time.

SUPRARENAL.

Physiological Action.

Local Action.—Powerful constrictor of the blood vessels, causing marked blanching of the part if applied to a mucus membrane, followed in a few hours by paralysis of the blood vessels, with local congestion, and sometimes secondary hemorrhage.

Vasomotor.—General action. It is a powerful constrictor of the systemic blood vessels, largely acting peripherally. To the heart it is a decided but fugacious stimulant, increasing both the rate and force. It is stated that this drug only constricts those structures which are supplied by the sympathetic

DESCRIPTION OF MAMMALIAN HEART APPARATUS.

This consists of a large zinc tank (Z) in which is a 15-litre bottle (A) surrounded by water maintained at a temperature of 37° C. by a small Bunsen burner (Y). The bottle contains Ringer's fluid, through which oxygen is allowed to pass for three hours before the experiment. A glass tube (C) runs through a perforated cork to the bottom of the bottle. To the upper end of this glass tube is attached a piece of rubber tubing, which goes through the side of the tank. To the end of this is attached a large glass cannula. A second perforation of the cork contains another glass tube (B) through which the oxygen passes into the bottle. A small gauge (X) is so arranged that the gas from the tank (O) is maintained at a uniform pressure in the bottle (A).

The animal being first completely anesthetized is bled from the femoral artery, the thorax rapidly opened in the median line anteriorly, the heart with a portion of the aorta rapidly dissected out. The cannula above described is slipped into the aorta and securely tied. The heart is represented in position at (D). The left auricle is opened, and a small rubber balloon (E) is passed through the mitral valve into the left ventricle. This is connected by a rubber tube to a tambour, on the surface of which a writing lever (W) rests. When the air in the balloon is compressed by the contraction of the ventricle the rubber surface of the tambour is forced upward, and the lever (W) resting on it lifted, and writing on the drum makes an upstroke representing systole of the heart, the downstroke being diastole.

It will be seen that when the fluid from the bottle is forced through the cannula by the pressure of the oxygen it will flow into the aorta, thus closing the aortic valves. The only outlet it has is through the coronary arteries, thence to the veins, and out over the external surface of the heart. This fluid is collected in a small bucket (G), which is so arranged that it will automatically tip and empty itself, immediately falling back to be refilled. Each tip completes an electrical circuit by dipping the electrode (H) into the mercury bath (K), one wire being attached to the frame of the bucket, and the other to the mercury. These two wires run to the marker (M) connected with a battery (Bat.), this marker recording on the drum each tip of the bucket.

It is evident that the greater the flow through the coronary arteries the more often will the bucket tip, hence, the closer together will be the markings.

When we wish to show the action of a drug on this isolated heart, the substance in solution is injected into the rubber tube above the cannula. With this apparatus the heart will continue to beat for several hours. The isolated mammalian heart tracings in the text were made by this method.

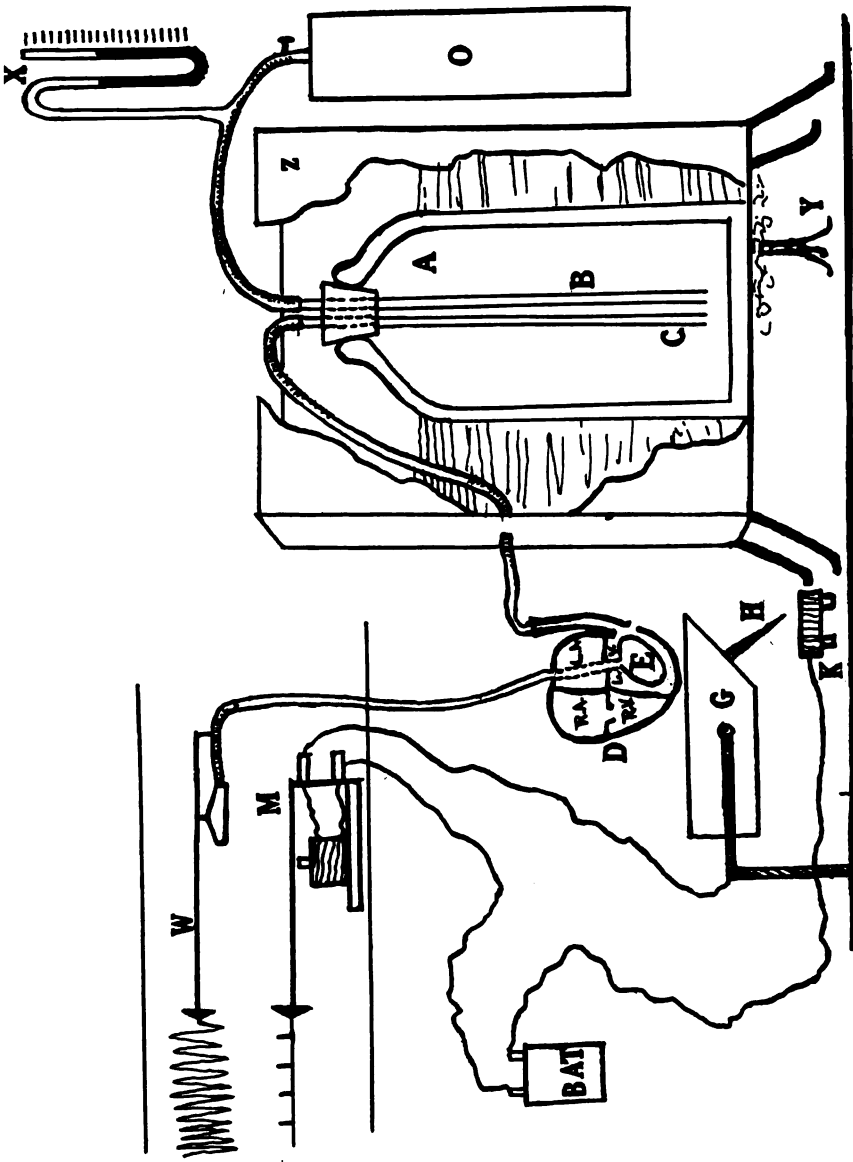
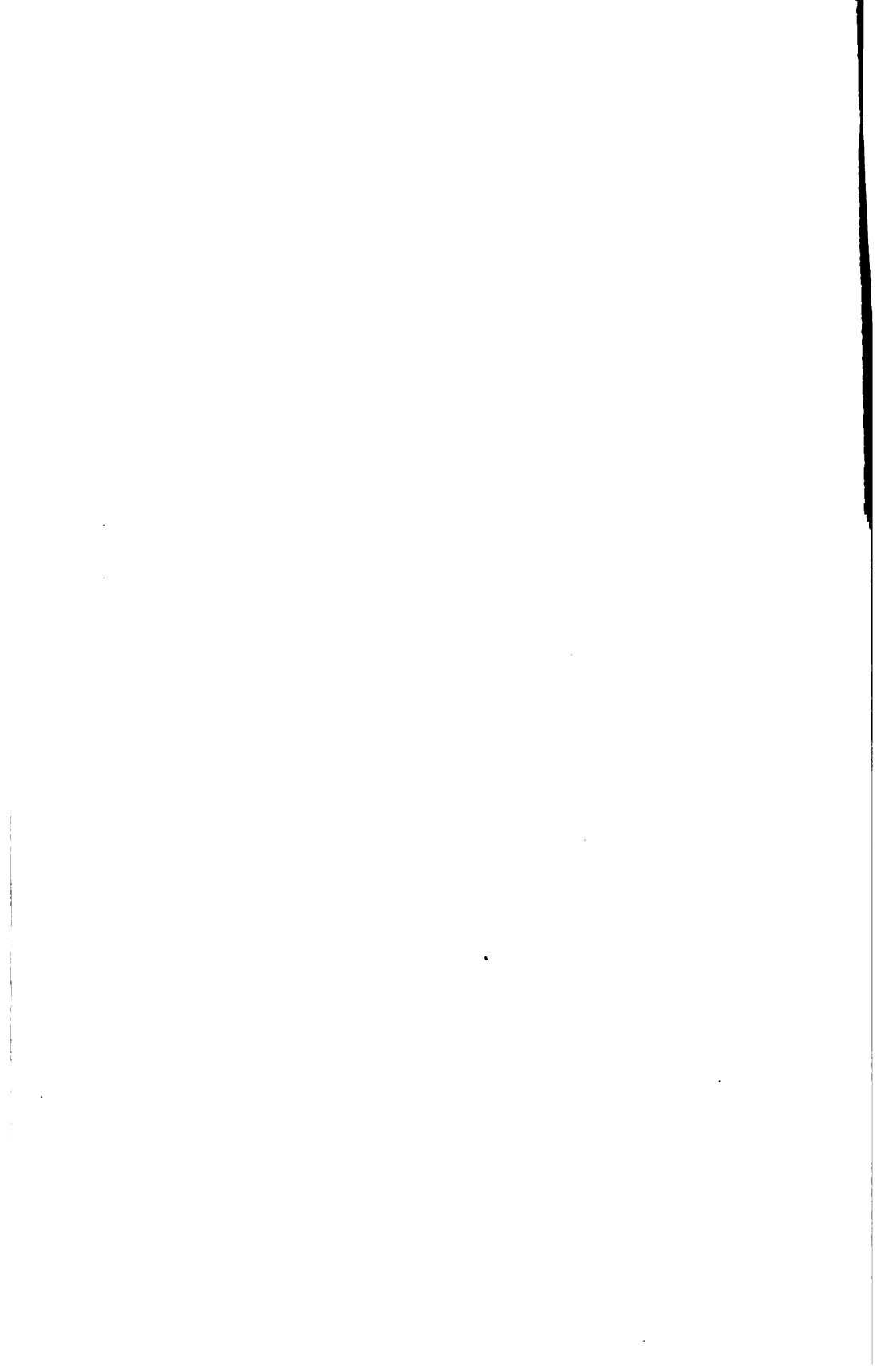


Fig. 8.
 Diagram of mammalian heart apparatus.
 (For description see opposite page.)



nervous system. The vessels of the lungs, liver, and coronary arteries are, therefore, not affected by it.

Absorption and Elimination.—The substance is rapidly absorbed, but almost as quickly destroyed, hence its action in the human being is very fugacious, and it is said to have no effect when given by the mouth. For general physiological action it must be administered either hypodermically or intravenously.

Preparations.

Glandulæ suprarenales siccae; dose, five grains. This is the crude drug from which adrenaline, the active principle, is obtained. In this form it is only suitable for local use, as in suppositories; it is difficult to render it sterile. **Adrenaline chloride**; dose, ten minims. This is a non-official preparation, but the one in most common use. It is a one one-thousandth of adrenaline in salt solution.

Therapeutic Applications.

Local Uses.—1. As an aid to cocaine in local anæsthesia; this has already been discussed. 2. To stop hemorrhage; it is useful whenever the hemorrhage can be reached by direct application, as in the nose and throat, in the rectum and, less certainly, in hemorrhage from the stomach. To be effective it must be applied directly to the bleeding point in the full strength of the adrenalin solution, and kept in contact for some time. As has been noted, however, in discussing the physiological action, hemorrhage that is controlled by adrenalin chloride sometimes recurs because of secondary paralysis of the blood vessels.

In the treatment of local congestion, as in conjunctivitis, rhinitis, and hemorrhoids, it is of decided value, particularly in rose cold and hay fever, constricting markedly the swollen turbinates, clearing the head, and giving great temporary relief. It may be used in the form of a spray, as:

℞ Sol. Adrenalin Chloride, f3℥.
Normal Salt Solution, q. s. ad f3℥.

Sig:—Use as a spray.

In the Treatment of Shock and Collapse.—Here it is best given intravenously, 10 to 20 minims being added to a pint of

normal salt solution. A less effective mode is to use it hypodermically in ten-minim doses. It has been shown experimentally that this substance when injected intravenously will produce arteriosclerosis; therefore, it should be used with considerable caution. There have been a few cases of sudden collapse following its use. Empirically it has been of great benefit in the treatment of asthma.

PITUITRIN.

(Not official.)

This drug is an extract from the posterior lobe of the pituitary gland, and has of late been much used, both as a stimulant in shock, to contract the uterus after labor, and in the treatment of acromegaly.

Physiological Action.

This closely resembles the physiological action of adrenaline, but appears to be more powerful. It stimulates the heart, constricts the vessels peripherally, save those of the kidney, which are dilated, and the amount of urine is markedly increased. The substance also exerts a powerfully constrictive action directly on the muscles, increasing peristalsis. The most pronounced effects are produced by hypodermic injection of 5 to 10 minims. A second injection should not be given since, experimentally, this is at times followed by a fall in pressure.

NORMAL SALT SOLUTION.

Physiological Action.

Local Action.—Is somewhat sedative and cleansing.

Secretion.—Increases all the secretions of the body.

Circulation.—Stimulant to heart and vasomotors, acting mainly, however, by increasing the bulk of the fluid in the blood vessels.

Action on the Kidney.—Powerful, non-irritant diuretic, increasing greatly the total amount of urine.

Therapeutic Application.

A normal salt solution is one which has the same tension as the blood plasma, accurately, 0.85 per cent. This may be made,

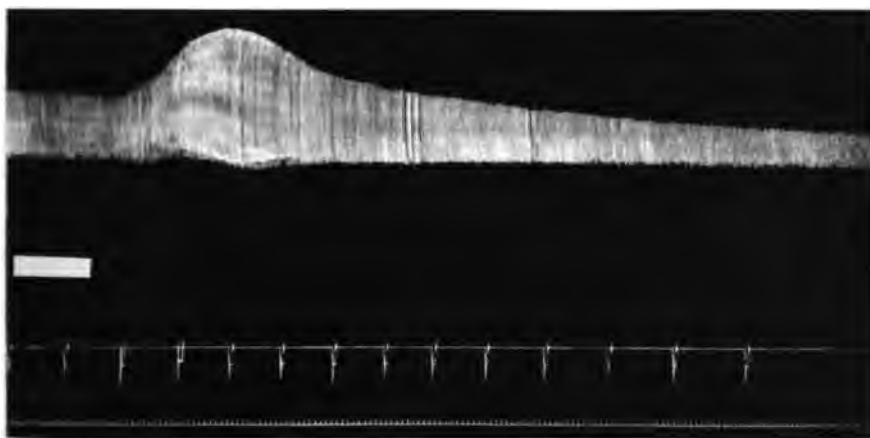


Fig. 9.

Isolated mammalian heart tracing, showing the effect of adrenaline. The middle line indicates the amount of flow through the coronaries, the distance between the strokes representing the time required to fill the tip-bucket (see Fig. 8). It will be noted that during the action of the drug the time is lessened, showing that the flow is increased, thus indicating dilatation of the coronaries. White space indicates where drug was injected. (Courtesy, A. N. Richards, Pharmacological Laboratory, University of Pennsylvania.)

approximately, by adding a teaspoonful of salt to a pint of water. It is given intravenously, subcutaneously, by hypodermoclysis, or by the bowel (enteroclysis).

It is useful, first, in the **treatment of shock**, particularly that due to hemorrhage, as it increases the volume of the plasma.

It is valuable, too, in **suppression of the urine**, as in uræmia, particularly if there be no dropsy. For this purpose it had best be given hot. **To reduce high temperature** high enemas of ice cold salt solution are sometimes useful when cold baths are not well borne.

When using salt solution intravenously or hypodermically every aseptic precaution must be taken. It is best injected where the tissue is loose, as under the breasts, or in front of the thighs, and here a pint of salt solution may be given. It should be done slowly, with the bag of the fountain syringe only just high enough to let the fluid run. It is a decidedly painful procedure. The salt solution should be at about 100° F., so that when it reaches the blood it will be at the body temperature. As has already been said, the addition of 10 minims of adrenalin chloride increases its efficacy in shock. The intravenous method is the most rapid, but here especial care must be taken in regard to infection and every precaution against injecting air into the veins. The simplest as well as a very effective method is to inject normal salt solution high into the bowel. The patient is placed upon the left side, the hips slightly elevated with the pillow, or the foot of the bed raised; a high rectal tube is passed into the bowels for a distance of twelve to fourteen inches, and the salt solution allowed to flow in at the rate of about a quart an hour. This method does not involve danger of infection, as do the other two, and is not painful, but has the disadvantage of being slightly slower in its effect.

It aids in the elimination of toxic substances, as in uræmia septicæmia, peritonitis, and lead poisoning. It would seem rational to saturate the saline solution with oxygen before using it, as experimentally all the tissues of the warm-blooded animals require this before they will functionate when isolated from the body. The isolated mammalian heart will beat for several hours if the Ringer's fluid with which it is infused is saturated with oxygen, but if oxygen is not added there will be no pulsation at

all. It requires several hours to saturate the solution. The oxygen must be allowed to bubble through the fluid from the bottom, and then the vessel must be tightly corked.

MUSK.

Musk has been used only empirically, mainly in the treatment of collapse in the course of the infectious fevers, particularly in typhoid. Dose, fifteen grains in emulsion per rectum. It is of very questionable value, is worth, when pure, about one dollar a grain, but is almost always adulterated.

II. DRUGS THAT DILATE THE BLOOD VESSELS.

ALCOHOL.

Physiological Action.

Locally.—Irritant. When continuously applied in concentrated form for long periods of time it tends to the production of fibrous tissue.

Brain.—In the normal individual, usually, it first increases cerebral activity, probably due to a depression of the inhibitory centres of the brain; in large doses, it is a powerful cerebral depressant. In pathological conditions, however, such as profound toxæmia, small, often-repeated doses of alcohol may quiet delirium, while overdoses may increase it.

Pupil.—Usually slightly dilated.

Secretions.—Increased, particularly that of the skin.

Reflex Arc.—Depression of the spinal cord.

Respiration.—Depression.

Circulation.—Vasomotors depressed, causing dilatation of the blood vessels.

Heart.—Fugacious, indirect stimulant. Since the heart is stimulated and the vessels dilated there is little effect on the blood pressure.

Special Action.—Alcohol is a distinctly toxic substance, but when oxidized yields about as much heat and energy as the fats—namely, nine calories per gram. To a large extent, it is burned up in the body under certain circumstances may yield to the organism its energy, and is in this sense a food; but alcohol can

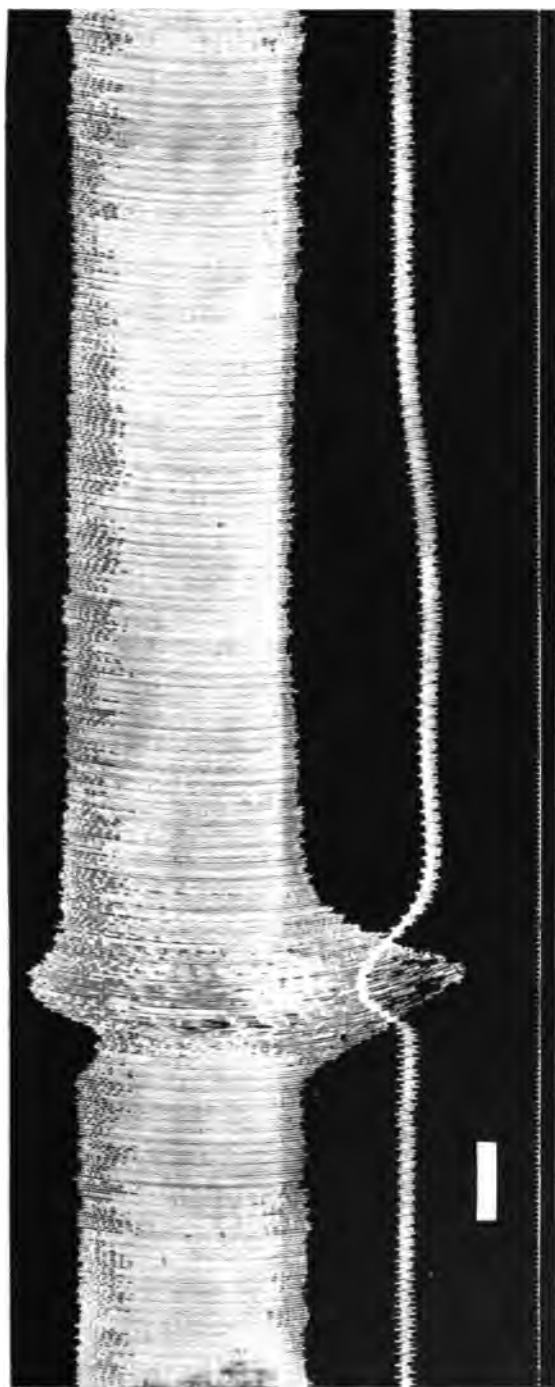


Fig. 10.

Combined blood-pressure and cardiographic (downstroke, systole) tracing showing action of adrenalinic. White space indicates where drug was injected. (For description of method see Figs. 3 and 4.) (Courtesy, A. N. Richards, Pharmacological Laboratory, University of Pennsylvania.)

never become a part of the tissue of the body as do the true foods, such as the proteids, carbohydrates, and fats. In this sense it is not a food; it yields energy, but does not make tissue.

Kidney.—It is an irritant, increasing the amount of urine.

Absorption and Elimination.—It is absorbed and eliminated with fair rapidity. Under the most favorable circumstances 10 per cent. of it is eliminated as alcohol, the remainder is broken up into water and carbon dioxide. The channels of elimination for alcohol are the kidneys, lungs and skin.

Temperature.—Because of the dilation of the blood vessels and the increased radiation of heat produced by alcohol, the oxidation of the body is probably increased; still there is a fall in the internal temperature. The surface temperature, however, usually rises.

Toxicology.

Acute Alcoholism.

Gastro-intestinal tract, often nausea and vomiting.

Mental Condition.—Patient becomes talkative, often incoherent; generous; easily persuaded.

Pupil.—Dilated.

Skin.—Becomes warm, moist, and flushed.

Reflexes.—Diminished.

Gait.—Irregular and incoördinate, probably due to disturbance of the sensory system.

Respiration.—Usually slowed.

Pulse.—Rapid, full, and soft.

Special.—There is the odor of alcohol on the breath; the urine is increased; the body temperature falls.

Second Stage.—Sleep, from which the patient can be aroused; skin becomes cold; all the other symptoms above mentioned become intensified; the pulse, however, late in alcoholism may become very weak.

Note.—Notice the close relation between these symptoms and those of ether narcosis.

Treatment of Acute Alcoholism.

Rest in bed. An emetic, such as apomorphine hypodermically, one-eighth of a grain, or zinc sulphate, grains twenty. Cathar-

tics—Divided doses of calomel, one-tenth of a grain every fifteen minutes for ten doses; next morning magnesia sulphate, one-half ounce, in hot water. Diet—Milk, milk toast, and soft-boiled eggs.

To overcome the loss of appetite and nausea resulting from failure of the gastric secretion we are usually compelled to use an irritant; to relieve the depression strychnine is valuable or the crude drug containing it, *nux vomica*. We might write, then:

R Tincturæ Nucis Vom., fʒss.
Tincturæ Capsici, fʒil.
Tincturæ Gentian Comp., q. s. fʒiil.

M. Sig:—One teaspoonful in water a half hour before food 3 times a day.

DELIRIUM TREMENS.

When alcohol is ingested for a long period of time, usually in excessive amounts, the drug produces a form of toxæmia which is known as delirium tremens. It is characterized, as the name implies, by tremor and delirium. The patient is in a state of shock. The tremor and delirium are sometimes preceded by extreme nervousness and quick, jerky movements.

Mental State.—Delirium with delusions of a terrifying character, the patient usually being on the defensive.

Pupil.—Dilated.

Skin.—Cool.

Reflexes.—Diminished, but there is a marked coarse tremor.

Respiration.—Rapid, shallow.

Pulse.—Rapid and weak.

Body Temperature.—Subnormal.

It must be borne in mind, however, that there may be marked variations in these symptoms, and, if there is any injury or infection, the temperature, as a rule, rapidly rises and the prognosis becomes very grave.

Treatment.

If the delirium tremens has immediately followed an acute debauch it is well to use the eliminative measures mentioned for acute alcoholism. The chief indication, however, is to produce sleep. For this purpose we have at our disposal a list of hypnotics already studied in detail, the most efficacious of which is probably



Fig. 11.

Combined blood-pressure and cardiographic (downstroke, systole) tracing showing slight action of alcohol. White space indicates where drug was injected. (For description of method see Figs. 3 and 4.) (Courtesy, A. N. Richards, Pharmacological Laboratory, University of Pennsylvania.)

chloral, the bromides being helpful to relieve sensory disturbances. We might write:

R Chloral Hydrat., ꝯss.
Sodii. Bromid., ꝯi.
Aque Cinnamomi, q. s. ad fʒiij.

M. Sig:—One teaspoonful every hour for 3 doses.

This will give us ten grains of chloral and twenty grains of sodium bromide at a dose.

We must not forget, however, that chloral has a decidedly depressant action on the heart and must be used with considerable caution.

Hyoscine hydrobromide, one one-hundredth of a grain given hypodermically, is often effective, and paraldehyde in one-dram doses may be useful. Morphine sometimes must be resorted to, but as it lessens elimination it is usually to be avoided. Owing to the depression of the patient, stimulants to the circulation are usually indicated.

Digitalis, though slow in action, is here often beneficial in ten-drop doses of the tincture every four hours.

Alcohol, though often productive of excellent symptomatic results, and still used in the treatment of delirium tremens by many practitioners, is on rational grounds to be avoided. Fluid extract of ergot in one dram doses has proven of great value.

CHRONIC ALCOHOLISM.

Remember, first of all, that you are usually treating a neurosis, commonly inherited, and the most important factor in the treatment is the control of your patient by the right sort of suggestion, this depending altogether on the temperament of the individual. It may be in one case by exciting fear as to the physical condition, or in another by appeal to his moral or religious sense, or in still another by an appeal on purely reasonable grounds.

Occupy as much of the patient's time as possible by exercise, massage, baths, etc.

Avoid, save when necessary, the use of hypnotics.

Strychnine in steadily increasing doses usually produces good effects, though not always. Sometimes atropine given in the same way until the physiological action is produced seems to lessen the desire for the drug.

Where the nervous symptoms are marked hyoscine is sometimes of value. The absolute withdrawal of the alcohol is usually indicated.

The gastro-intestinal tract requires a stomachic prescription, as already given.

The salines, such as sodium phosphate, two drams in a glass of hot water, may be given in the morning, as rather free watery purgation aids in elimination. The patient should also be encouraged to take easily digested, nourishing food, and to drink freely of water.

When you are treating chronic alcoholism it must be remembered that you are dealing with not only a neurosis, but also with organs diseased by the action of the drug. There is chronic fibroid gastritis, usually some degree of arteriosclerosis, often hypertrophic cirrhosis of the liver, chronic interstitial nephritis, and not uncommonly myocardial degeneration. Any one or all of these may be looked for in a given case of long standing, due, as has been said, to the tendency of alcohol to produce fibrous tissue.

If dilute alcohol is taken in excess, as by beer drinkers, the tissues are prone to undergo fatty necrosis rather than sclerotic change.

Alcoholic insanity, as a rule, must be treated by isolation, absolute abstinence from alcohol, suggestion, and the management of symptoms. In any particular case the prognosis should be guarded.

Therapeutic Application.

Preparations.—*Spiritus frumenti* (whiskey) contains 44 to 55 per cent. of alcohol. *Spiritus vini gallici* (brandy) contains 46 to 55 per cent. of alcohol. *Vinum album* (white wine) and *vinum rubrum* contain 8 to 15 per cent. alcohol.

The beers contain anywhere from 2 to 5 per cent. of alcohol, but also a considerable percentage of carbohydrates, and are, therefore, of some value as food.

As a Stimulant to the Circulation.—Alcohol is useful as a fugacious stimulant, as in collapse, mainly because of its indirect irritant action on the heart, and this is its chief use in acute infectious fever. Its routine employment through the course of an infection is to be avoided.

It sometimes aids in **quieting delirium** in the acute infectious fevers.

In small doses it improves **digestion** temporarily by acting as a stomachic, but in large doses it does harm by destroying the activity of the gastro-intestinal secretions.

In **acute disease** it is best administered in the form of whiskey, the dose depending upon the individual. One-half to one ounce may be given every two hours in water or milk until the desired effect is produced or indications have developed to stop the drug.

If the delirium is increased, if there is a marked odor of alcohol upon the breath, if the skin becomes relaxed and moist, the drug is doing harm and should be discontinued.

Respiratory Tract.—Alcohol has long been used to abort a cold. It is of some value given in the following way: the patient takes a hot bath and after getting into bed drinks a hot lemonade containing one to two ounces of whiskey. This produces diaphoresis and aids in the elimination of toxins.

During exposure to cold, however, alcohol is commonly taken, and imparts a feeling of warmth because it dilates the peripheral blood vessels, brings more blood to the skin and so stimulates the peripheral nerves; but as it lowers body temperature it probably does more harm here than good by lessening resistance. After a return to a warm atmosphere, however, a single dose of alcohol may be of value in relieving internal congestion.

Tuberculosis.—It has no curative effect upon the disease. It is a toxic substance and, used for a long period of time in a chronic disease of this character, is likely to cause the alcoholic habit and do harm. Chronic alcoholics who are tubercular usually do not thrive. In certain well-selected cases alcohol has the merit of stimulating digestion and influencing metabolism.

Local Uses.—It is a valuable antiseptic to the skin, also hardens it, and is more germicidal when diluted with water to a 70 per cent. strength. It is a valuable solvent, useful in the treatment of herpes simplex, and as an ingredient of mild evaporating lotions. For instance, we might write:

℞ Acid boricl, gr. xxx.
Alcohol, fʒi.
Aquæ rosæ, q. s. ad fʒiij.
M. Sig:—Use externally.

NITRITES.

Physiological Action.

These have no important effect locally, either on the brain or on the pupil.

Secretion.—They tend to increase the secretion of the skin by dilating the blood vessels.

Reflex Arc.—Depressant to the motor side of the spinal cord.

Respiration.—They are depressant; the rate is quickened, and often irregular.

Circulation.—*Heart.*—Slight fugacious stimulation and increase in rate due to the falling pressure. *Vasomotors.*—Powerful peripheral dilation of the blood vessels, this being their most important effect.

Special Action.—Tend to destroy the hæmoglobin of the blood and to cause the appearance of methæmoglobin. This only occurs when given in very large doses. The blood becomes chocolate in color, and its oxygen-carrying power is diminished.

Elimination.—These substances are partially oxidized in the body and eliminated as nitrates.

On Muscle Structure.—Tend to paralyze unstriated muscle throughout the body, particularly shown by its action on the blood vessel wall.

Body Temperature.—Tend to reduce body temperature by increasing heat radiation.

Toxicology.

Mental Action.—There is a feeling of fullness in the head, often disturbance of vision, with dizziness.

Pupil.—Usually dilated.

Skin.—Flushed and moist; there may be cyanosis.

Respiration.—Rapid or irregular; patient often complains of dyspnœa.

Reflexes.—Lessened.

Pulse.—Rapid and soft.

Body Temperature.—Subnormal.

Blood.—Produces methæmoglobin.

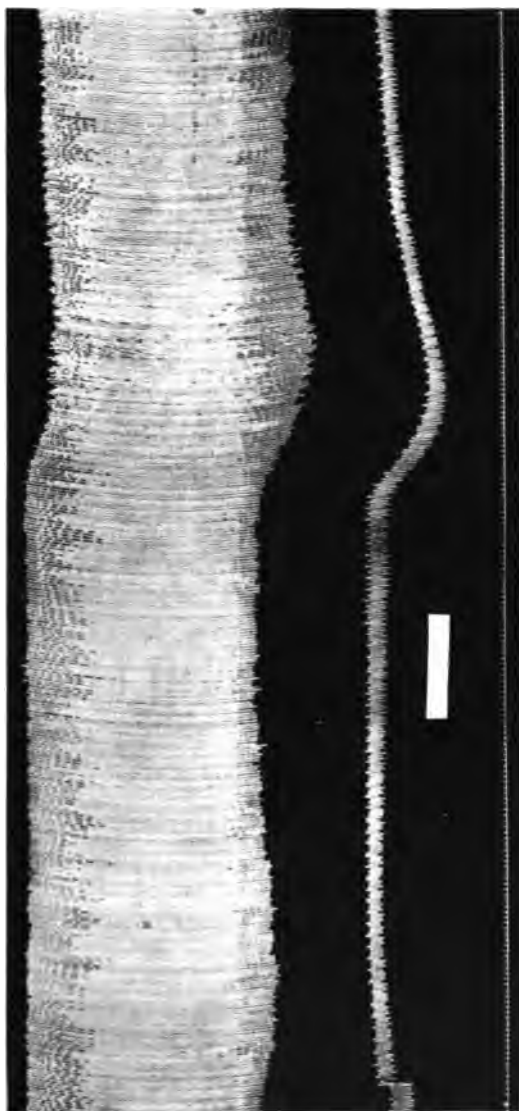


Fig. 12.

Combined blood-pressure and cardiographic (downstroke, systole) tracing showing action of nitroglycerine. White space indicates where drug was injected. (For description of method see Figs. 3 and 4.) (Courtesy, A. N. Richards, Pharmacological Laboratory, University of Pennsylvania.)

Treatment of Nitrite Poisoning.

Open the windows; get the patient into the fresh air; perhaps give a hypodermic of one-thirtieth of strychnine; but in acute cases the condition is so fugacious that it usually requires no treatment.

CHRONIC NITRITE POISONING.

This condition is seen sometimes in manufacturers of nitroglycerin. The patients suffer from anæmia and headache. The treatment is a change of occupation.

Therapeutic Uses.

Preparations.—*Amylis nitris*; dose, two to five mins. *Spiritus glycerylis nitratis*; min. one to two. *Triturates* of nitroglycerin each containing one one-hundredth of a grain (non-official). *Sodium nitrite*, grain one.

It must be emphasized that all preparations of nitroglycerin have merely a transitory effect, but they differ relatively in this respect. The most rapidly acting and fugacious is amyl nitrite; then nitroglycerin, a little less transitory, and sodium nitrite, still less so.

Therapeutic Indications.

To Lower the Blood Pressure.—For this purpose the nitrites are the most valuable drugs we have. In chronic Bright's disease, where the tension is extremely high and the heart is subjected to tremendous strain in working against constricted blood vessels, the nitrites are most valuable. If you desire a permanent action on the blood vessels give sodium nitrite, grain one in pill every four hours. The most common preparation is spiritus glycerylis nitratis, minim one.

This may be prescribed alone, or you may write:

R Spiriti Glycerylis Nitratis, m. xxiv.
Elixir Aromatic, q. s. ad fʒiii.

M. Sig:—One dram every 2 hours.

For hypodermic use amyl nitrite is rarely used, because rather irritant. If cardiac stimulation is required, and we wish to modify the tendency of these drugs to stimulate the blood vessels, we might combine the infusion of digitalis and the nitrites, thus:

R. Sodii Nitriti, gr. xxiv.
Infusi Digitalis, q. s. ad fʒvi.

M. Sig:—Two teaspoonfuls 3 times a day after food.

This gives two drams of infusion of digitalis to one grain of sodium nitrite.

The tablet triturates of nitroglycerin are most commonly employed, but they are very variable in strength and tend to deteriorate with age. For immediate action two or three drops of amyl nitrite on a handkerchief, by inhalation, are effective. The substance is put up in the form of pearls, each one containing three to five drops, which may be crushed and inhaled as required. These pearls are non-official. In using the nitrites to lower blood pressure, particularly in diseases of the kidney, it must be kept in mind that the high blood pressure represents an attempt on the part of nature to supply sufficient blood to a diseased organ, and that unless the high tension is producing symptoms it is usually unwise to lower it. When the nitrites are pushed to their physiological limit they often cause palpitation and flushing of the face.

To Relax Spasm.—In all forms of **asthma**, but particularly in the so-called idiopathic asthma, the drug is fairly effective in relieving the attack. Amyl nitrite may be given as above described, or a hypodermic of one one-hundredth of a grain of nitroglycerin with one-quarter of a grain of morphine may be administered. Its effect, however, tends to be lost, as it is a drug for which a tolerance is easily established. In true angina pectoris, which is possibly due to a spasm of the coronary arteries, it is useful. In convulsions due to uræmia, tetanus, strychnine poisoning, and sometimes epilepsy, preceded by an aura, it may help to abort the paroxysm; also in spasms of reflex type, such as those due to gastro-intestinal irritation. If the spasm is of cerebral origin, as in uræmia, the drug is still of value, because, though it does not affect the brain, yet by depressing the motor cord it lessens the irritability of the motor pathways.

In some forms of headache apparently due to vasomotor spasms the drug is of value if given early in the attack. In chills caused by peripheral spasms, as in malaria, in obstinate hiccough, and in other reflex irritations, the drug should be given a fair trial. It is said to be beneficial also in nervous vomiting of reflex origin.

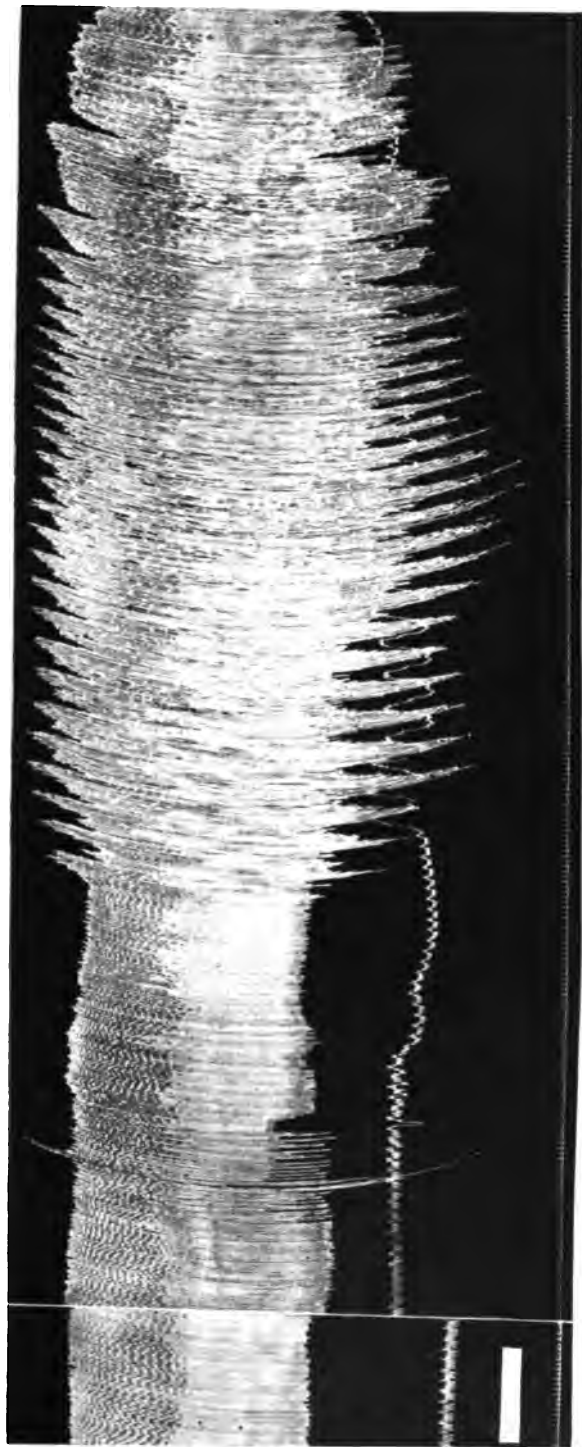


Fig. 13.

Combined cardiographic (downstroke, systole) and blood-pressure tracing showing the maximum effect of strophanthine (digitalis group). White space indicates where drug was injected. White line running through cut indicates where section of tracing has been cut out. (For description of method see Figs. 3 and 4.) (Courtesy, A. N. Richards, Pharmacological Laboratory, University of Pennsylvania.)

Internal Hemorrhage.—Nature relieves hemorrhage by lowering blood pressure, which it does by dilating the blood vessels and producing shock. If, in the presence of hemorrhage from a part of the body which cannot be reached locally, there is fairly high blood pressure, the nitrites may be tried—as in hemorrhage from the bowel, or from the lung, or in other forms of internal hemorrhage.

Contra-indications.—The nitrites have been much used in the treatment of shock; they are, however, usually contra-indicated, because they increase vascular dilatation, and the cardiac stimulation produced is very fugacious.

All the drugs of this group when exerting their physiological action tend to lower the blood pressure.

III. DRUGS THAT STIMULATE THE HEART.

DIGITALIS.

Physiological Action.

Local.—Irritant.

Brain.—No decided effect.

Pupil.—No influence.

Secretion.—Increases the amount of urine mainly by augmenting the blood supply to the kidney.

Reflex Arc.—Lessens reflexes by stimulating the inhibitory centres of the spinal cord.

Respiration.—No direct effect, yet often relieves dyspnoea by increasing the blood supply to the lungs.

Circulation.—A powerful stimulant to the heart muscle, this being its most important physiological action; it is also a stimulant to the vagus, both peripherally and centrally. Secondly, there is paralysis of inhibition, causing an increase in the heart rate, but this is seen only in toxic conditions. In the warm-blooded animals the heart stops in diastole; in the cold-blooded animals, in systole. It is a distinct stimulant to the vasomotor centre, causing constriction of the blood vessels.

Absorption and Elimination.—Digitalis is very slowly absorbed, and much more slowly eliminated.

Toxicology.

Because of its local irritant action digitalis often produces nausea, vomiting, and sometimes greenish stools. The other symptoms are entirely dependent upon its action on the circulation. The **pulse** becomes slow, full, strong, and later often dicrotic. As the poisoning progresses, with paralysis of inhibition, the pulse may become rapid, and sometimes weak. The **reflexes** are slightly diminished. The **urine** is usually increased, and the patient may complain of palpitation, also of throbbing in the head.

Treatment of Digitalis Poisoning.

Give tannic acid freely in twenty to thirty grain doses. Wash out the stomach or give emetics, as before stated. Sedatives such as the bromides, are sometimes useful, but usually drugs are of little avail. The poisoning is seldom fatal.

Cumulative Action.

The striking peculiarity of this drug is that it may be given for a long period of time, and produce apparently no effect upon the circulation; when, suddenly, the toxic symptoms of the drug may appear. When using it in chronic cases, therefore, it is well occasionally to discontinue it for a time, and also to watch very carefully for a distinct slowing of the pulse, which indicates its therapeutic limit.

Therapeutic Application.

The active **principles** of digitalis are the glucosides, namely: Digitoxin, digitalin, digitalein, and digitophyllin, which are mainly stimulant to the cardiac muscle; we have also digitonin. At present by far the most active and reliable **preparations** are those of the crude drugs. The most important are: Tincture of digitalis, min. ten; infusum digitalis, drams two; pulvis digitalis, grain one; digitalin, French, one-thirtieth of a grain, German, one-quarter of a grain.

The last two preparations may be tried for hypodermic use; their action is, however, very uncertain. When giving any preparation of digitalis by the mouth its irritant action is to be kept in mind.



Fig. 14.

Isolated mammalian heart tracing showing marked action of strophanthine (digitalis group) with tendency to constriction of the coronaries. White space indicates where drug was injected. (For description of method see Fig. 8.) (Courtesy, A. N. Richards, Pharmacological Laboratory, University of Pennsylvania.)

It is very likely to disturb the stomach, and should always be given after food.

Uses.

In Circulatory Weakness.—In chronic failure of the circulation digitalis is by far the most valuable drug we have, particularly when auricular fibrillation exists. In acute conditions it is of little value because its action is so slow. In grave cases ten minims of the tincture may be used hypodermically, but this is likely to produce an abscess, and a hot compress should be applied over the needle puncture, and precautions as to asepsis taken.

Chronic Valvular Heart Disease with Failing Compensation.—Because auscultation reveals a murmur it does not necessarily indicate the use of digitalis. If the heart has sufficiently hypertrophied to make up for the leak in the valve, there is no need of stimulation.

If, on the other hand, there are signs of failing compensation, such as shortness of breath on exertion and swelling of the ankles at night, then the drug is indicated.

It may be prescribed thus:

R Infusi Digitalis, ℥vi.

Sig:—Two teaspoonfuls 3 times a day after eating.

Should the cardiac weakness be associated with high blood pressure from spasm of the vasomotors, the stimulant action of the drug on the vasomotor centre may be counteracted by the use of sodium nitrite. (See prescription under Nitrites.)

Should the condition be associated with decided dropsy the digitalis itself will to some extent relieve this, because it increases the amount of urine. Should we, however, wish still further to increase the action of the kidneys, we may add a stimulating diuretic, such as caffeine. Thus:

R Pulv. Digitalis, gr. xxiv.
Caffein., gr. xlviii.

M. et Ft. in cap. No. 24.

Sig:—One three times a day after meals.

When there is a tendency to wakefulness the caffeine is contra-indicated.

Powdered squills may be substituted for the caffeine, being a powerful heart stimulant and also irritant to the kidneys, but it

is likely still further to disturb the digestion. Sometimes calomel is of benefit by causing purgation and thus aiding in the relief of dropsy, also because it is probably diuretic. If it is given, however, the patient must be carefully watched for symptoms of salivation. We might write:

℞ Pulv. Digitalis, gr. xxiv.
Pulv. Scillæ, gr. xii.
Hydrarg. Chlor. Mitis, gr. xii.
M. et Ft. in cap. No. 24.
Sig:—One after each meal.

The reasons why digitalis helps a failing heart are the following: It stimulates the force of the cardiac beat; it slows the cardiac rate, and increases the heart rest, causing a more complete systole and diastole; it increases the blood supply through the coronary arteries to the cardiac muscle, thus bringing more nutrition to the heart.

All the preparations of digitalis are likely to deteriorate, and the dried leaves from which these are made are particularly prone to spoil with age. The infusion should be made fresh, and it is well to designate Allen's English leaves, because these have been subjected to careful physiological tests.

STROPHANTHUS.

Physiological Action.

The action of strophanthus is almost identical with that of digitalis, but there are the following differences: 1. It is a muscle poison, having a tendency to cause griping pain in the abdomen rather than nausea. 2. It acts on the blood vessel walls rather than on the vasomotor centre, and is a less powerful constrictor. 3. There is some difference of opinion about the diuretic action of the two drugs; strophanthus is probably less diuretic than digitalis. 4. It is not as powerful a drug as digitalis, but is more rapid in its action, and has not the cumulative effect of digitalis.

Preparations.

Tincture of strophanthus, minims ten. Strophanthinum, one two-hundredth of a grain, a glucoside obtained from strophanthus; it is physiologically definite, active, and may be used hypo-

dermically, but is locally irritant. Strophanthin Boeheringer, 1 to 1000, is dispensed in glass ampoules, and has been used intravenously with good results.

Therapeutic Application.

Strophanthus may be used for the same purpose as digitalis, and the drugs may be used interchangeably when either one disturbs the stomach. In prescribing both strophanthus and digitalis, it is well to change from one to the other, and also to change the preparation if there is gastric disturbance.

CAMPHOR.

Physiological Action.

Local.—Irritant.

Brain.—Therapeutic doses sedative; large doses cause peculiar delirium and cerebral excitement.

Secretion.—Tends to check.

Reflex Arc.—Little effect.

Respiration.—Little influence.

Circulation.—Experimentally, the action is doubtful, but it certainly dilates the peripheral blood vessels; in healthy animals no definite cardiac stimulation can be perceived.

Absorption and Elimination.—It is somewhat rapidly absorbed, and is eliminated as camphoglycuronic acid.

Toxicology.

Camphor when given in very large doses may produce nausea, vomiting, pain in the abdomen, headache, delirium, and sometimes convulsions.

Treatment of Camphor Poisoning.

The use of sedatives, like chloral, and the washing out of the stomach.

Therapeutic Application.

To Stimulate the Heart.—This is probably the most important use of camphor, and is based largely on clinical experience, not on a knowledge of the physiological action of the drug. It seems to be fairly well demonstrated that in cases of sudden car-

diac failure during the course of an acute infectious disease or due to other cause camphor is a fugacious but powerful heart stimulant. It should be given thus:

R Camphor, gr. xii.
Ol. Olive (sterilized), fluid drams ii.

This will give us two grains of camphor to every twenty minims of the oil. It should be used hypodermically, and be repeated every hour or two.

As a Cerebral Sedative.—Camphor is useful as a mild sedative to the brain, particularly in headache.

R Camphor Monobrom., gr. xxiv.
Acetphenetidini, gr. xxiv.
Caffein., gr. xii.

Ft. in cap. No. 12.

Sig:—One every hour for three doses.

This gives us one grain of caffeine, two grains of camphor monobromate, and two grains of acetphenetidum. The camphor here acts as a sedative, and the caffeine, empirically helps to relieve headache; the same is true of the acetphenetidum.

R Ext. Bellad., gr. i.
Camphor Monobrom., gr. xxxvi.

Ft. in pill. No. 12.

Sig:—One every three hours.

To Lessen Secretion.—In the treatment of relaxing diarrhoea it is helpful, and is often used in coryza.

Camphor is useful, too, as a spray in subacute inflammation of the nose and throat; one to two per cent. in oil, for its astringent action. Oleum eucalypti, minims thirty, has a slightly stimulant anæsthetic action. Menthol, grains three, is cooling and slightly anæsthetic. Petrolatum liquidum is used as a vehicle, q. s. fluid ounce three.

Treatment of Diarrhoea.—The combination of camphor and opium, as in tr. opii camphorata, is very beneficial in the treatment of diarrhoea, as already mentioned.

As a Counter-Irritant.—In either of the following official liniments camphor may be employed as a counter-irritant in sore throat, and in abdominal or muscular pain:

Camphor, grains five; usually prescribed in pill, or dissolved in olive oil, as above.

Aqua camphoræ, vehicle, dose one-half ounce.

Spirits of camphor, fifteen minims.

Linimentum camphoræ, 20 per cent.

Linimentum saponis, six parts of camphor in soap. This gives us two distinct camphor liniments, the former made with cotton-seed oil, the latter made with soap and alcohol. Do not confound the above with *linimentum saponis mollis*, containing soft soap in alcohol.

Camphor monobromate, grains five.

Acidum camphoricum, grains ten.

AMMONIA.

Physiological Action.

Local.—Extremely irritant and caustic.

Brain.—No influence.

Pupil.—Unaffected.

Secretions.—Increased by local contact because of irritant action.

Reflex Arc.—Stimulates the motor cord.

Respiration.—Stimulates.

Circulation.—Stimulates heart and vasomotor centre.

Kidney.—Irritant.

Absorption and Elimination.—Its profound local irritant action greatly retards its absorption. It is eliminated mainly as urea.

Toxicology.

Reflexes.—Increased; may be reflex convulsions.

Respiration.—Rapid.

Pulse.—Rapid and strong at first; rapid and weak subsequently.

Temperature.—At first slightly elevated, later subnormal; patient dies from exhaustion. When recovery ensues there may be permanent stricture of the œsophagus.

Treatment of Ammonia Poisoning.

If there is œdema of the glottis tracheotomy at once. In the more common form of gastro-enteritis give lemon juice or well-

diluted vinegar; the stomach may be carefully washed out, the pain relieved by hypodermics of morphine, the inflamed mucous membrane of the œsophagus and stomach soothed by acacia in the form of an emulsion, or olive oil. The symptoms of shock must be met by the external application of heat, and hypodermics of atropine, one one-hundredth, and strychnine, one-thirtieth.

Subsequent stricture of the œsophagus, if it occurs, must be treated by dilatations with a bougie.

The symptoms are almost solely dependent on the local action of the drug. First, if a very large dose of ammonia be taken, it may cause œdema of the glottis and death by mechanical asphyxia. Second, if this does not occur, and it rarely does, the symptoms are those produced by any gastro-intestinal irritant and caustic, namely: Abdominal pain; tenderness; nausea; vomiting, often bloody; excessive purgation and tenesmus; urine of high specific gravity, containing albumin and casts, possibly, blood; skin at first moist and warm, later cold.

Therapeutic Application.

Preparation.—Aqua ammoniæ fortior (strong ammonia water) contains 28 per cent. by weight of gaseous ammonia.

Aqua ammoniæ, the one in common use, 10 per cent.; dose, ten to thirty drops.

Spiritus ammoniæ; dose, ten minims.

Spiritus ammoniæ aromaticus, most important preparation for internal use; from one-half to one dram.

Ammonii carbonas; dose, five grains.

Ammonii chloridum; dose, five grains.

Linimentum ammoniæ.

Uses.

As a Cardiac Stimulant.—Ammonia is used mainly for acute symptoms as an immediate cardiac stimulant, is usually given by inhalation, but sometimes by the mouth in the form of the aromatic spirits of ammonia. It acts here largely, not by directly stimulating the heart through absorption, but reflexly by its local irritation of the mucous membrane, in the same way as a glass of cold water thrown in the face of a patient who has fainted will cause reflex cardiac stimulation.

As a Stimulant Antacid.—When there is hyperacidity of the stomach, usually due to fermentation and the formation of organic acids, associated with a good deal of headache, aromatic spirits of ammonia, one dram, every two hours, will often counteract the acidity and promote normal gastric secretions by irritation. It may sometimes be advantageously combined with a little sodium bicarbonate. Thus.

R Sp. Ammoniae Arom., ℥iiss.

Sodii Bicarb., ʒss.

Aq. Menth. pip., q. s. ad ℥iil.

M. Sig:—Teaspoonful every 2 hours.

As a Counter-Irritant.—Ammonia is useful to relieve both muscle pain and abdominal pain. It may be applied in the form of the official liniment, already mentioned.

As an Antidote.—Well diluted it may be used as an antidote to the mineral acids.

Ammonium chloride is also of some value for this purpose, and is in more common use.

As an Expectorant.—Ammonium carbonate, in five-grain doses in capsule or solution, has been used a good deal as a stimulating expectorant in pneumonia and chronic bronchitis.

SPARTEIN.

This is an alkaloid obtained from *scoparis*, or the broom plant. Its value as a cardiac stimulant is at present very doubtful. As *sparteinæ sulphas*, the dose is from one-fifth to one grain.

ADONIS.

Contains an active principle, *adonidine*, which is a glucoside; dose, one-half grain. Of doubtful value as a cardiac stimulant, but may be tried.

All the drugs in this group tend to cause a rise in blood pressure, mainly by stimulating the force of the cardiac beat and constricting the blood vessels.

IV. DRUGS THAT DEPRESS THE HEART.

ACONITE.

Physiological Action.

Local.—Anæsthetic, depressing the peripheral sensory nerves.

Brain.—No direct effect.

Pupil.—Tends to dilate by producing shock.

Secretion.—Increases the sweat.

Reflex Arc.—Depresses the sensory cord.

Respiration.—Depresses.

Circulation.—In therapeutic doses slows the heart by stimulating inhibition, and only in poisonous amounts depresses the cardiac muscle, lessening the force of each beat.

Absorption and Elimination.—Somewhat rapidly absorbed and more slowly eliminated by the kidney, therefore fairly prolonged action.

Body Temperature.—Tends to produce a fall by lowering blood pressure.

Toxicology.

Gastro-Intestinal Symptoms.—Being a local anæsthetic, it does not usually cause vomiting. Often produces a tingling sensation in the lips, and later in the extremities, by affecting the *peripheral sensory* nerves.

Brain.—Usually not affected, though the cerebral anæmia produced may in rare cases cause convulsions.

Pupil.—Usually dilated.

Skin.—Moist and cool.

Reflexes.—Lessened.

Respiration.—Depressed.

Pulse.—At first slow and soft, later rapid, weak and irregular.

Body Temperature.—Fall.

Death is usually due to paralysis of respiration, strychnia being the antidote.

Treatment of Aconite Poisoning.

This is a very grave form of poisoning. Emetics often fail because of the anæsthesia of the stomach; tannic acid should at once be given in large doses, and the stomach immediately washed out with a solution containing tannic acid. Drugs that act in stimulating the heart muscles are here indicated.

The vasomotor drugs, caffeine, atropine, strychnine, and adrenalin, will be found helpful, but atropine is by far the most important, because of its peripheral paralysis of the pneumo-

gastric. The patient must be kept absolutely at rest in a horizontal position, and external heat applied to the body.

Therapeutic Applications.

Preparations.—Tincture of aconite, minims five; generally given not oftener than three times a day, to lessen cardiac excitability. The great indication for its use is *cardiac overactivity* due to excessive hypertrophy. This is not uncommonly seen in aortic regurgitation, the patient complaining of palpitation, and sometimes of shortness of breath. The drug should be used cautiously, and discontinued as soon as the symptoms disappear, for it is usually much easier to depress a function than to stimulate it.

To Produce Sweating.—Aconite is very commonly added to so-called fever mixtures, which are much used in the treatment of the exanthemata, such as scarlet fever and measles, in which there is likely to be some excitability of the circulation, dryness of the skin, and a diminished amount of urine. To meet these indications we might write:

R Tr. Aconit., m. xlviii.
Liquor Potass. Citrat., fʒiiss.
Spirit Ætheris Nitrosi, q. s. ad fʒiil.

Sig:—One teaspoonful every 3 hours (for an adult).

The aconite here tends to lower the blood pressure, and to promote the skin secretion. The spiritus ætheris nitrosi, being really a nitrite, tends to dilate the blood vessels, and the solution of potassium citrate acts as a diuretic. The aconite should be left out if there is any tendency to circulatory weakness.

Aconite is sometimes used **externally** in ointments to relieve itching, but this should be with caution, because the drug may be absorbed through the skin.

Aconitine, the active principle of aconite, dose one four-hundredth of a grain, is probably the most poisonous drug we have. It has no advantage over the tincture of aconite, and is of little practical value.

VERATRUM.

Physiological Action.

Locally.—Irritant.

Reflex Arc.—Depressant to motor side of the spinal cord.

Circulation.—Marked slowing of the heart; possibly some dilation of the blood vessels.

Absorption and Elimination.—Rapidly absorbed and rapidly eliminated.

Temperature.—Tendency to lower the body temperature.

Note.—The physiological action of this drug, particularly on the circulation, is at present doubtful; but that it decidedly slows the heart rate, and lowers blood pressure, is certain. The doubtful points are its influence upon the vasomotor system, and whether or not it is a true heart depressant.

Therapeutic Application.

Preparations.—Fluid extract of veratrum, one to three minims. Tincture of veratrum, min. ten.

It is of doubtful value in the early stages of **pneumonia** to lower blood pressure in cases where there is delirium and high tension early in the disease. The fluid extract may be given in doses every two hours until the pulse is slightly slower.

In the treatment of **uremia** again of doubtful value; possibly useful in controlling convulsions by depressing the cord and lessening high tension.

Note.—A drug about whose action little is really known and whose therapeutic application there is much dispute.

Veratrum must not be confounded with veratrina (veratrine), an alkaloid whose dominant physiological action is that of a muscle poison and which, though official in a dose of one-thirtieth of a grain, has little known medicinal use. Its action, however, closely resembles that of aconitine.

CHAPTER VI.

DRUGS THAT LESSEN THE EXCITABILITY OF THE NERVOUS SYSTEM.

THE BROMIDES.

Physiological Action.

Local.—Irritant.

Brain.—Depressant, particularly to the motor areas.

Reflex Arc.—Depresses the motor cord and motor nerves.

Respiration.—Depressant.

Circulation.—Slightly depressant to the heart and blood vessels.

Absorption and Elimination.—The bromides are somewhat rapidly absorbed, and slowly and continuously eliminated, largely through the kidneys, and slightly through the bowel. When the bromides are long administered, the excretion of the chlorides in the urine is markedly increased; in fact, the bromides seem to take the place of the chlorides in the body, and it is probable that the withholding of the chlorides may tend to promote retention of the bromides.

Toxicology.

Bromides seldom produce acute poisoning, but when given therapeutically in increasing doses for a long period of time, they are likely to cause bromism, which is characterized by stupor, fœtor of the breath, and acne eruption. The treatment is to stop the drug and purge freely.

Therapeutic Applications.

Preparations.—All preparations of the bromides are locally irritant and likely to produce nausea and vomiting. They are best given in solution, usually well diluted, seldom in powdered form as they take up water too rapidly, and never in tablets. They are incompatible with the alkaloids.

Potassii bromidum, grains twenty; irritant.

Ammonii bromidum, grains twenty; slightly stimulant and irritant (not deliquescent).

Sodium bromide, grains twenty; less irritant.

Strontii bromide, grains twenty; least irritant, and slowest.

The dose of the bromides is very variable; sometimes two drams may be given in the day.

In the Treatment of Idiopathic Epilepsy.—Here the bromides are the most useful drugs. They had best be given night and morning. They probably act by depressing the motor area of the brain.

The combination of potassium and ammonium bromide seems to act better than large doses of either one of the salts. If combined with a little arsenic larger doses can be taken without producing a skin eruption. The dose of the bromides depends entirely upon the individual case, the drug being increased until the symptoms of bromism are produced or the convulsions controlled. We might write thus:

R **Ammonii bromidi.**
Potassii Bromidi, aa ʒi.
Liquor Potassii Arsenitis, m. xlviii.
A. q. Cinnamoni, q. s. fʒvi.

M. et Sig:—One teaspoonful night and morning after food, increasing as directed.

Should we desire to combine codeine with the bromides, the pure codeine will mix with sodium bromide in watery solution, while codeine sulphatis will not.

In the treatment of **spinal convulsions**, such as occur in strychnine poisoning and tetanus, and in reflex convulsions of children, its use has been described under the treatment of strychnine poisoning. The drug acts by depressing the sensory nervous system.

To Relieve Nervous Insomnia.—The bromides are only mildly hypnotic, but they lessen the irritability of the sensory cord, and if the patient is disturbed by slight noises and is irritable they are often helpful.

In Gastric Conditions.—In reflex nervous vomiting, as in pregnancy and in excessive acidity of the stomach due to a neurosis, the bromides are very useful, given in ten-grain doses three times a day.

CANNABIS INDICA.

Physiological Action.

Locally.—Irritant.

Brain.—At first produces slight stimulation, followed by depression.

Toxicology.

Large doses may produce disturbance of the stomach, with vomiting and, most characteristic, pleasant illusions, particularly magnifying space and time.

The treatment of the poisoning is to stop the drug, empty the stomach in the usual way, and use caffeine.

Therapeutic Application.

Preparations.—Fluid extract cannabis indica; dose, one to five minims.

Extract cannabis indica, one-fifth of a grain.

The preparations of this drug are very variable, and the dose of any given preparation must be steadily increased until it gives its physiological effect.

Uses.

The drug has been used for many purposes. It is effective in neurosis associated with the menopause, in the relief of headache, and is said to be valuable in the treatment of cough and in functional dysmenorrhœa. It is a drug worth trying, but, as has been said, we must be sure we have an active preparation. It is best given alone in the form of the fluid extract, two drops, steadily increasing a drop at a dose until the effect is produced. It is more agreeable to take if in some alcoholic menstruum, and the patient may be instructed to drop it into a little wine. When put into water it is likely to stick in the bottom of the glass and be difficult to take.

ASAFÆTIDA.

Physiological Action.

Local Action.—Stimulant.

Brain.—Depressant.

Therapeutic Uses.

Preparation.—Pil asafœtidæ, grains three to five.

Emulsum asafœtidæ, ounces one to two.

Asafœtida, grains two.

Asafœtida has a very disagreeable taste and odor, and should be given by the mouth only in the form of a pill or capsule. It is a valuable drug in mild nervousness, and is useful as a carminative—namely, to expel flatus. An effective way of giving it for this purpose is to use it in a high enema. Thus:

℞ Emuls. Asafœtidæ, ℥i℥i.
Terebinth., m. x.

This may be put into a pint of hot water and injected high up into the bowels, or it may be used alone.

In the reflex spasms of children, and particularly to control the paroxysms of whooping cough at night, asafœtida is useful given in the form of a suppository. Thus:

℞ Asafœtidæ, ʒi.
Ol. Theobromatis, q. s.
Ft. in sup. No. 12.
Sig:—One at night.

SUMBUL.

Extract, grains five. Empirically believed by many to be useful in nervous conditions, particularly those due to menstrual disorders.

VALERIAN.

Physiological Action.

Believed to be a sedative to the brain. Used in nervous insomnia and for excessive sexual excitement.

Preparations.—Tr. valerianæ ammoniata; dose, one dram.

Ammonii valeriate, grains five.

The taste is extremely unpleasant. It is given in a pill containing two or more of the above slightly sedative drugs, as follows:

℞ Asafœtidæ, gr. xxiv.
Ext. Sumbul, gr. xxiv.
Ammonii Valeratis, gr. xlviii.
M. Ft. in pil. No. 24.
Sig:—One three times a day after food.

It is rather doubtful if such a combination has much real effect, yet in some cases of neurosis it seems to be followed by improvement.

CIMICIFUGA.

A mild sedative, said to be particularly valuable in the treatment of chorea.

Fluid extract, dose fifteen minims, steadily increased until frontal headache is produced.

CHAPTER VII.

DRUGS USEFUL IN TREATING ANÆMIA.

IRON.

Physiological Action.

The exact physiological action of iron is unknown, but the following facts are fairly well established.

As a remedial agent organic preparations of iron have no particular advantage over inorganic, but are less likely to irritate the stomach.

All preparations of iron are probably absorbed as the albuminate.

Iron is, perhaps, only very slightly excreted through the urine, but in the main is reabsorbed by the intestinal tract, and thus excreted.

Foods containing an excess of iron do not have the same effect on the blood as does iron when given alone as a drug. The explanation of this is uncertain. It may be that when iron is given in the form of foods less of it is absorbed; or that iron when given alone has the power to stimulate the blood-making organs—the spleen, the bone marrow, and the lymphatics.

All preparations of iron are more or less constipating. Some are extremely irritant and astringent.

Whatever may be the cause, it is practically certain that iron has the power to increase the hæmoglobin of the blood when it is below normal, and particularly is this true when the blood is otherwise normal (chalybeate action).

Preparations of Iron.—Those that are insoluble, if used in the form of a pill or capsule for the purpose of increasing the hæmoglobin of the blood, have no great astringent property, and, are, therefore, least constipating.

Ferrum reductum, grains five (80 per cent. metallic iron).

Massa ferri carbonatis, grains five (20 per cent. metallic iron).

Pilulæ ferri carbonatis, one or two pills (10 per cent. metallic iron; one-half grain in a five-grain pill).

Nonstringent Preparations of Iron (soluble).—Liquor ferri et ammonii acetatis, Basham's mixture, one-half ounce. Said to be valuable in the treatment of Bright's disease when associated with anæmia.

Syrupus ferri iodidi, ten min. Some value in the anæmias of children, the iodide acting as an alterative.

Ferri citras, grains five; fairly soluble in water (16 per cent. iron). This can be obtained in 1 cc. ampoules containing two grains. Ferric citrate for hypodermic use must be injected deep in the muscles.

Ferri phosphas solubilis, five grains (12 per cent. iron).

Ferri pyrophosphas solubilis, five grains (10 per cent. iron).

Ferri et potassii tartras, five grains (15 per cent iron); can be prescribed with alkalies.

Elix. ferri, quininæ et strychninæ phosphatum, one dram contains one one-hundredth of strychnine and one-half grain of quinine. This preparation is largely used as a general tonic and stomachic. In the treatment of true anæmia of the chlorotic type it does not contain sufficient iron to be of great value.

Ferratin (non-official), ten grains (7 per cent. iron); said to be non-irritant.

The Astringent Preparations of Iron.—Tinct. of ferric chloride, minims ten. Of little value in anæmia. Useful as a local application to the throat in subacute inflammations. Of some value in the treatment of chronic diarrhœa, and said to be a specific in erysipelas.

Ferri sulphas, actively astringent. Of little use internally.

Liquor ferri supsulphatis (Monsel's solution), minims five, well diluted. Used in hemorrhage from the stomach, and locally as an astringent and styptic.

Ferri hydroxidum cum magnesiæ oxido, one-half ounce every five or ten minutes. Used exclusively as an antidote to arsenic.

Therapeutic Application.

The great value of iron internally is in the treatment of anæmia of the chlorotic type; that is, it greatly reduces the percentage of hæmoglobin without much decreasing the number of blood cells. At least five grains of metallic iron should be given in twenty-four hours. We might write thus:

R Mass. Ferri Carbonatis, 3ii.
Ft. in pil. No. 24.
Sig:—Two pills three times a day after meals.

If the condition is more or less chronic, with considerable depression, arsenic and strychnine are useful aids, and we could write:

R Ferri Reducti, 3ii.
 Strych. Sulphat., gr. 1.
 Arseni Trloxidi, gr. 1.
M. et Ft. in cap. No. 24.
Sig:—One three times a day after meals.

It must be particularly borne in mind that since iron is the antidote to arsenic, the two substances should never be prescribed in solution unless it be highly acid. If, however, we wish to get the stomachic action of strychnine together with the chalybeate action, we may write as follows:

R Ferri Pyrophosphatis, 3ii.
 Strych. Sulphat., gr. 1.
 Aq. Dest., fʒiii.
M. et Sig:—One teaspoonful 3 times a day before meals.

As has already been stated, iron is most useful in the chlorotic form of anæmia. It is, however, of some value in the treatment of secondary anæmia when the underlying cause of the condition has been corrected. In the pernicious type of anæmia where there is relatively little reduction of hæmoglobin, but great destruction of the cellular elements of the blood, it is of least value; but even here, combined with arsenic, it is of some benefit. Of late, it has been much used hypodermically.

ARSENIC.

Physiological Action.

Locally.—Extremely irritant, and in concentrated form toxic.

General Physiological Action.—When given in therapeutic dose there is no physiological action that can be demonstrated.

On the nervous system it is probably stimulant. Small doses of arsenic are supposed to decrease the oxidation in the body and, therefore, lessen tissue destruction.

Arsenic when given for a long period of time in increasing doses has a tendency to cause neuritis, atrophy of the muscles,

pigmentation of the skin, an increased growth of hair, and sometimes a horny scaling of the skin. Arsenic has some important effect on the blood-forming apparatus which is at present not perfectly understood.

Toxicology.

Acute Poisoning.—Symptoms appear in about half an hour after ingestion; there is difficulty in swallowing; epigastric pain; vomiting; diarrhœa of rice-water character resembling that of cholera, but rarely showing blood; there is usually great thirst; the skin becomes cold and clammy; there are cramps in the muscles, the pulse becomes rapid and feeble, the respiration shallow; death may follow from exhaustion; the urine may contain arsenic, also albumin and casts, and is usually small in amount because of the tremendous watery purgation. There is often a remission of symptoms in arsenical poisoning in which the patient appears to be recovering, but this will be followed by the return of symptoms of collapse, sometimes associated with jaundice.

Treatment of Acute Poisoning.—Give the antidote freely, namely, the sesquioxide of iron, made by precipitating any acid preparation of iron with an alkali, preferably with magnesia, as in the U. S. P.; this should be given in excess, twenty to thirty grains. The pain may be controlled by morphine, the collapse by vasomotor and cardiac stimulation, as before outlined; the great loss of water by hypodermoclysis of normal salt solution. The body temperature may be supported by external heat.

Chronic Poisoning.—*Sources.* Dyes, wall paper, stuffed animals, arsenical pigments, beers.

Symptoms.—Weakness, loss of appetite, gastro-intestinal disturbance, often diarrhœa, but nothing characteristic. If the arsenic has been inhaled, conjunctivitis, coryza, hoarseness, and cough are not uncommon. There may be enlargement of the liver, with jaundice; various skin eruptions may occur; pigmentation and scaling may be quite prominent. There is a tendency to peripheral neuritis, headache, paræsthesia, anæsthesia, and a loss of power usually in the legs and bilateral, with more or less atrophy of the muscles.

Diagnosis.—Most important, the history.

From Lead Poisoning.—No blue lines on the gums; bilateral

wrist-drop uncommon in arsenic; anæmia is present in both. Arsenic affects the lower extremities, lead the upper.

Therapeutic Uses.

Preparations.—Arseni trioxidum, one twenty-fourth of a grain.

Liquor potassii arsenitis (Fowler's solution), 1 per cent.; dose, three drops to be increased.

Atoxyl (non-official), less irritant than the ordinary preparations of arsenic, but also probably less effective. It can be given hypodermically in one-grain doses.

Sodium cacodylate (non-official); dose, two grains. Supposed to be less toxic than arsenic and less likely to disturb digestion, probably because it contains less arsenic than the more common preparations.

Salvarsan (606).

(Dioxydiaminoarsenobenzol.)

Neo-Salvarsan.

(Dioxydiaminoarsenobenzenemonomethane Sulphinate of Sodium.)

Salvarsan, given to the profession about three years ago by Ehrlich as a cure for Lues, has been subjected to a fairly exhaustive test, having been used in many thousands of cases. Neo-salvarsan, a later product, seems to have no proven advantage over the older form.

Salvarsan is dispensed in sealed vacuum tubes containing 0.6 of a gramme. It must be immediately dissolved in salt solution which has been freshly distilled and freshly made, and the resultant solution must be *absolutely clear*. It is said that many of the untoward symptoms that have been attributed to the drug are due to the use of water containing impurities. The dose varies from 0.2 to 0.6 of a gramme. Its use must be preceded by the finding of a spirochæte pallida or of a positive Wassermann reaction. It is contra-indicated in serious non-syphilitic disease of the kidneys, the nervous system, the eye, the circulation, and the lungs.

The administration of salvarsan is sometimes followed by

nausea and vomiting with diarrhœa, and more serious symptoms have been reported. After its use the patient should be kept in bed and carefully watched. This remedy can not be said to take the place of mercury and the iodides, but is a great addition to our armamentarium for the treatment of syphilis. It has finally been decided that the intravenous method is the best.

After the needle has been introduced into the vein, a small amount of normal saline should first be injected in order to ascertain that everything is moving smoothly, as the injection of even a small amount of salvarsan into the subcutaneous tissue will produce decided sloughing. It has proven especially valuable in the treatment of primary Lues, in the cure of the early secondary skin eruptions, and, in some cases, also of the later manifestations in the eye. A number of favorable reports have been published in regard to its use in locomotor ataxia when there is a positive Wassermann reaction. The administration of the drug requires special training, and it should be given only by those skilled in its use.

Local Uses of Arsenic.—By the dentist, to destroy nerves; to destroy malignant tissue, as in small epithelioma.

General Uses of Arsenic.—In the treatment of anæmia, leukaemia, etc., arsenic is the best drug we have.

It is also of some value in chlorosis when the condition is more or less chronic.

In certain chronic diseases of the skin, such as eczema, acne and psoriasis, arsenic internally is very useful.

In pernicious anæmia Fowler's solution may be given in increasing doses until there is disturbance of the gastro-intestinal tract or puffiness under the eyelids in the morning, either of which indicates the withdrawal of the drug. Arsenic does not seem to be curative in pernicious anæmia, and must be continued almost indefinitely. If disturbance of the stomach is produced atoxyl, as before mentioned, may be tried by the mouth or hypodermically.

In the treatment of chronic malaria it is useful to combat the secondary anæmia and also, probably, has a direct action on the plasmodium; it should be given in increasing doses.

Arsenic has been used with apparently good effect in the periodic forms of neuralgia and in chronic rheumatism.

In chronic chorea in children Fowler's solution may be given, increasing a drop a day, until intolerance occurs or the condition is controlled. As a general tonic to the nervous system when there is anæmia, it may be combined with strychnine and iron. It is apparently useful sometimes to increase the body weight in tuberculosis patients, in the aged, and in states of nervous exhaustion. But our knowledge of the physiological action of arsenic is so indefinite that its use in disease is largely empirical.

Fowler's solution is commonly prescribed thus:

R Liquor Potassii Arsenitis, fʒi.

Sig:—Two drops in water 3 times a day, increasing as directed.

MANGANESE.

Mangani dioxidum præcipitatum, five grains. Believed to be of some value in the treatment of chlorosis and other forms of anæmia. Its value, however, is extremely doubtful.

CHAPTER VIII.

DRUGS USED MAINLY TO LESSEN SECRETION OR EXCRETION.

I. VEGETABLE ASTRINGENTS.

VINEGAR.

Used by tampon as an emergency remedy in uterine hemorrhage post partum, and also probably of some value given by the mouth in hemorrhage from the stomach. May be used as an antidote to all the caustic alkalies.

TANNIC AND GALLIC ACIDS.

Most of the vegetable astringents depend largely for their activity on the presence of one or the other of these substances. The dose may be considered as ten grains.

Tannic acid is converted into gallic acid when absorbed. These acids are useful only as local remedies, and have little astringent effect when circulating in the blood.

Tannic acid is the antidote for all poisonous alkaloids, and glucosides, also to antimony, or tartar emetic. As has been intimated, when used internally they are generally not given alone, but in the form of one of the crude drugs containing one of them.

In the treatment of hemorrhage from the stomach, however, or externally when the hemorrhage can be reached directly, tannic acid is useful.

To summarize the use of the astringents we may say they are indicated: First, in the treatment of relaxing or serous diarrhœa. Second, in the local treatment of subacute and chronic inflammations of the mucous membranes generally, as in the nose, throat, rectum, and vagina. Third, they are of some use in the treatment of hemorrhage.

The following are the most important drugs which contain tannic acid:

Acidum tannicum, grains ten.

Unguentum acidi tannici, 20 per cent.

Unguentum gallæ, 20 per cent. Useful for external application, as in the treatment of hemorrhoids.

Glyceritum, acidi tannici, 20 per cent. Used as a local application, chiefly in the nose and throat; should be avoided in acute inflammatory conditions, but where there is more or less relaxation, with or without oozing of blood, it is beneficial.

Tincture of kino, one dram; used internally in relaxing diarrhœa.

Hæmatoxylon. Extract, fifteen grains.

Tincture gambir composita, one fluid dram; contains gambir and cinnamon.

Aqua hamamelidis. Locally a mild astringent.

Fluid extract of rhus glabra. Mainly used in subacute sore throat. It is well to combine it with potassium chlorate, thus:

℞ Potassii Chlorat., 3i.
Fl. ext. Rhœis Glabræ, fʒiiss.
Aq., q. s. fʒiil.

M. et Sig:—Use as a gargle.

Krameria. Tincture one fluid dram; mildly astringent in diarrhœa.

Agaric acid (called agaricin); dose, one grain. Said to be useful in lessening the night sweats of phthisis without producing the systemic effects of atropine, but the drug is extremely likely to disturb digestion.

In the practical application of the above drugs in the treatment of chronic relaxing diarrhœa we might write the following:

℞ Tr. Nuclis Vom., fʒil.
Acid Sulphuric. Aromat., fʒss.
Ext. Hæmatoxyl, ʒil.
Tr. kino, q. s. fʒiil.

M. Sig:—One teaspoonful 1 hour after meals in water.

The tincture of nux vomica is given for the purpose of toning up the muscular coat of the bowels, and the aromatic sulphuric acid as an astringent, which by rendering the solution acid, keeps the strychnine in solution. Tincture of kino and extract of hæmatoxylon are used as vegetable astringents.

If such a prescription as the above is ineffective, opium may be added in the form of the tincture or camphorated tincture.

II. MINERAL ASTRINGENTS.

LEAD.

Physiological Action.

Local Action.—Sedative and astringent.

General Physiological Action.—No really definite knowledge.

Toxicology.

Acute Lead Poisoning.—A very rare condition, due to the ingestion of lead acetate; it produces nausea, vomiting, and purgation, with white vomit and black stools, and the general symptoms of collapse so many times recorded. *Treatment:* Wash out the stomach, and give a soluble sulphate, like magnesium sulphate.

Subacute Lead Poisoning or Painter's Colic.—When there is more or less ingestion of lead, as in certain occupations, particularly that of painters, those affected are subject to acute attacks, which are characterized by the following *symptoms*: Marked constipation, usually anæmia of the secondary type, and extreme colicky pain in the abdomen, twisting round the umbilicus, and not associated with tenderness; the abdomen often becomes scaphoid. Any case of chronic lead poisoning may during its course be marked by such attacks. On the other hand, we may have chronic lead poisoning with no attack of the so-called lead colic. *Treatment:* Hypodermic of morphine, one-quarter of a grain; sometimes atropine, one one-hundredth of a grain.

The nitrites are also said to be of value, one one-hundredth of a grain of nitroglycerin or one grain of sodium nitrite. If the paroxysms are extremely severe, inhalations of amyl nitrite may be tried; after the pain has been relieved magnesium sulphate may be freely given as the antidote.

Chronic Lead Poisoning.—Early general *symptoms*: Disturbance of the gastro-intestinal tract, particularly loss of appetite and constipation, and, in rare cases, a metallic taste in the mouth. The lead line, or blue line, on the gums, absolutely characteristic when present, must not be mistaken for a collection of

tartar at the base of the teeth; they can be easily differentiated by slipping a piece of paper between the gum and the tooth, and noting whether the line be still present.

ANÆMIA.—This is usually of secondary type, the number of corpuscles and the hæmoglobin falling together. There is, often, however, much destruction of the red blood cells, frequently associated with basophilia; that is to say, the cells contain small granules which take the basophilic stains.

PARALYSIS.—This is usually bilateral, affecting most commonly the extensor muscles of the fingers and hands, beginning, it is said, in the middle and ring fingers; then the wrists become affected, and the patient is unable to extend his hand. This condition is spoken of as bilateral wrist-drop. It is said that the supinator longus remains normal. The affected muscles atrophy and contraction of the flexors sets in, giving a clawlike appearance to the hand. This is a form of peripheral neuritis. Lead may also induce almost any form of neuritis; in rare cases it produces a condition closely resembling the anterior poliomyelitis of children.

LEAD ARTHRALGIA.—Great pain in the joints, particularly at night, is sometimes seen without any definite demonstrable pathological change.

ANÆSTHESIA.—Local areas of paræsthesia or complete anæsthesia sometimes develop.

LEAD AMBLYOPIA.—A rare condition—slowly fading vision or almost complete blindness may exist. This failure of vision may be due to inflammation and degeneration of the optic nerves, or it may result from uræmia induced by lead nephritis.

KIDNEY.—The chronic interstitial type of nephritis is induced, showing little albumin, few casts, but a great quantity of urine of low specific gravity.

ARTERIOSCLEROSIS.—Lead is decidedly a predisposing cause to this condition.

LEAD ENCEPHALOPATHY.—This is a rather rare condition, presenting itself in coma, sometimes with convulsions closely resembling true epilepsy.

From the above description it will be seen that lead poisoning is very diverse in its symptomatology, making the diagnosis often extremely difficult. The anæmia, the lead line, the wrist-drop,

the history of colic and of a source for the lead are the most important factors. Sometimes in doubtful cases lead may be found in the urine.

Common Sources of Lead Poisoning.—Lead is by far the most common metallic poison, due to occupation. Painters, glaziers, plumbers (more rarely) and pottery decorators are most commonly affected. Lead poisoning is also rarely acquired through drinking water passing through lead pipes.

Treatment.—*Prophylaxis:* Thorough washing by workmen of their hands before meals. The use of respirators where there is considerable lead dust. Free ventilation. The use of large quantities of proteid foods, so that the hydrochloric acid of the stomach may unite with the proteid rather than with the lead, and thus prevent the formation of lead chloride.

Treatment of the Condition.—First stop the source of lead. Potassium iodide may be of value. We could write:

R Potassii Iodidi, ℥i.
Aq. Dest., q. s. ad ℥ss.

M. Sig:—Five drops after eating 3 times a day.

Strychnine, arsenic, and iron are very useful here, the first overcoming the depression and the last two relieving the anæmia. (See capsule, under **Iron**.)

The ingestion of large quantities of water is particularly important; next, saline purgatives, such as magnesii sulphatis effervescens, drams two, in water, each morning. Hot baths at night, with the addition of sulphur, are sometimes helpful, and moderate outdoor exercise if the conditions allow it, with massage and electricity for the atrophied muscles.

The prognosis is guardedly favorable. Sometimes it is well to push strychnine to its therapeutic limit, shown by stiffness of the muscles at the back of the neck or distinct increase in the reflexes. In the management of lead epilepsy, a rather rare condition, the convulsions may be controlled by sedatives, as before described, while bleeding, and the simultaneous intravenous injection of normal salt solution, is said to be of value.

Therapeutic Application.

Preparations.—Plumbi acetas, two grains, used internally by pill in the treatment of diarrhœa, but of no great value.

Liquor plumbi subacetatis, 25 per cent.

Liquor plumbi subacetatis dil., 7.5 per cent. strength, used as a mild local astringent sedative. (See lead water and laudanum, under Opium.)

SILVER.

Physiological Action.

Local Action.—Antiseptic, somewhat anæsthetic in strong solution of caustic, but superficial and self-limited in its destruction of tissue.

General Physiological Action.—Little known.

Toxicology.

Acute Poisoning.—There are symptoms of local irritation in the gastro-intestinal tract; abdominal pain; nausea; vomiting; purgation, sometimes bloody; signs of collapse. The vomited material is often white, soon turning black on exposure to light. The stains about the lips act in the same manner. *Treatment.*—Antidote, sodium chloride; control pain and purgation by morphine; use local sedatives to the mucous membrane, like acacia and egg albumen.

Chronic Silver Poisoning (argyria).—A deposit of minute particles of silver in the skin, first evident in the mucous membrane of the lips and eyelids, producing ultimately a grayish black discoloration of the face and exposed portions of the body. *Treatment.*—If this condition has once set in, it is almost impossible to relieve it. Let it be remembered that silver should not be given internally longer than two weeks at a time without a period of intermission.

Therapeutic Applications.

Preparations.—Argenti nitras, one-quarter of a grain. Argenti nitras fusus (stick of silver nitrate).

Preparations of silver should always be kept in dark bottles. Internally they should always be prescribed in pill form, and given alone or combined with the extract of opium or hyoscyamus. If special action on the intestinal tract is required, the mass may be put into a capsule coated with salol. For local effect

on the stomach and intestinal tract silver nitrate is used in the following conditions: 1. Chronic gastritis. 2. Gastric ulcer. 3. Chronic enteritis, but probably of less value. Used by some as a routine intestinal antiseptic in the management of typhoid fever. It may be written for thus:

R Argenti nitratis, gr. iiii.
Extract of Hyoscyami, gr. vi.

Ft. in pill. No. 12.

Sig:—One one hour before food. If you wish it to act upon the stomach; if on the intestine, it has best be given two hours after food.

If used in the treatment of gastric ulcer it is well to remember that there is more or less mucus in the stomach, and this may be to some extent removed by giving the patient twenty grains of sodium bicarbonate in a glass of hot water about one hour before the nitrate pill.

Use of Silver as a Caustic.—Here it may be used in saturated solution or in the form of the solid stick. It is valuable for destroying excessive granulations and small ulcers in the nose and throat. As an antiseptic for the throat it may be used on a swab in a strength of ten to twenty grains to the ounce. Some use it even stronger than this. For tuberculosis of the larynx a spray has been recommended of two grains to the ounce.

In the treatment of gonorrhœa an injection of a very weak solution of silver nitrate, such as one-quarter of a grain to the ounce, may be used.

In ulcerations of the cervix the solid stick of silver nitrate is often applied.

In pruritus ani or pruritus vulvæ a solution of four grains to the ounce is said to be beneficial.

In the treatment of bed sores a solution of twenty grains to the ounce may sometimes abort their development.

In conjunctivitis it is used in varying strength, being sometimes applied to the lids in solid stick, as in granular lids, or it may be used in a solution of from one to ten grains to the ounce, followed usually by salt solution to neutralize.

In the treatment of colitis silver is used in high enema in a

strength of from ten to sixty grains to the quart, followed by an injection of normal salt solution if the enema is retained.

Many preparations of silver are used besides the official salts; among these are argyrol, 10 to 50 per cent. solution, and protargol, 1 to 10 per cent. solution. These preparations are less irritant than the ordinary silver nitrate and can be used in stronger solutions, the former is practically non-irritant; the latter is much less irritant than silver nitrate. The antiseptic power of argyrol is by many doubted.

ALUM.

Physiological Action.

Irritant and astringent.

Therapeutic Application.

Little used internally.

Twenty grains to the ounce may be given in the treatment of subacute inflammation and oozing hemorrhages.

For sweating of the hands and feet two grains to the ounce dissolved in water containing alcohol is a useful external application.

Preparations.—Alum is the sulphate of aluminum and potassium. It should be remembered that it is soluble in nine parts of water, but is insoluble in strong alcohol.

COPPER SULPHATE.

Physiological Action.

Locally a violent irritant; in dilute solution powerfully antiseptic.

Toxicology.

Symptoms of gastro-enteritis, with green vomit; antidote, yellow prussiate of potash (potassii ferrocyanidum), seven grains.

Therapeutic Application.

Copper sulphate, grains five, as an antidote to phosphorus. It may be tried as an intestinal antiseptic in a one-half grain dose.

ZINC.

Physiological Action.

Locally in concentrated form irritant; in weak solution rather sedative; depressant to the nervous system generally.

Chronic Poisoning.—It causes a peculiar and rather rare condition known as brass founders' disease, characterized by weakness, muscular pains, rigors, soreness of the chest, and headache, followed by sweating and deep sleep. The treatment is change of occupation. Antidote, sodium bicarbonate or tannic acid.

Therapeutic Application.

Preparations.—Zinc sulphate, one to three grains.

Zinc oxide, two grains.

Unguentum zinci oxidi, one part to four of benzoinated lard.

Zinciacetate, two grains.

Zinci valerianas, one to two grains.

Zinc sulphocarbolas (not official), one to two grains.

The preparations of zinc that are used internally are usually given in pill as mild astringents and antiseptics in the treatment of diarrhoea. They are of slight value for this purpose. They have also been largely used in the treatment of epilepsy, but here also their benefit is very doubtful.

As a local application unguentum zinci oxidi is a good sedative preparation, and this ointment is often used as the basis or vehicle for other remedies, as in the treatment of acute eczema with much itching. We might write:

℞ Acid. Boric., gr. xx.
Phenol, gr. v.
Ung. Zinci ox., q. s. ℥i.

M. Sig:—Use externally.

CERIUM OXALATE.

Cerii oxalas, grains five. Little is known of the action of this substance.

In vomiting of reflex origin, such as that of early pregnancy, it is said to be valuable.

BENZOL.

Benzol (benzene), dose 5 to 10 minims, has recently been found beneficial in Hodgkin's disease and leukæmia, but it should be used *cautiously*.

CHAPTER IX.

DRUGS USED TO INCREASE THE COAGULABILITY OF THE BLOOD.

GELATINE.

When locally applied gelatine probably increases blood coagulability simply by causing the corpuscles to stick together. It has been given hypodermically and by the mouth for internal hemorrhage, but it is of doubtful value, and when given hypodermically there is great danger of infection.

CALCIUM CHLORIDE.

Dose, five to ten grains in solution in water. Is probably of value in internal hemorrhage by increasing the coagulability of the blood.

BLOOD SERUM.

In hemorrhagic conditions in the newborn, human serum given hypodermically, has proven valuable, and of late horse serum has been used in many forms of hemorrhage in the adult with varying results.

CHAPTER X.

INTESTINAL ANTISEPTICS.

These are an extremely unsatisfactory class of remedies, since they must be poisonous to bacteria and non-poisonous to the tissues, and must act upon thirty-odd feet of intestine. They must be active in very dilute solution, in order to remain in the intestinal tract long enough to produce an effect; they must not be rapidly absorbed; and, since they must come in contact with the hydrochloric acid of the stomach and the alkaline reaction of the intestinal tract they must not readily decompose and be rendered inert.

BETANAPHTHOL.

Grains five, given in capsule.

Locally.—Rather irritant; should be administered after food.

SALOL.

Phenol salicylas, grains five, insoluble in water; usually given in capsule or powder; unaffected by the acid reaction of the stomach, but broken up in the intestinal tract into salicylic acid and carbolic acid.

GUAIACOLIS CARBONAS.

Grains five. Very likely to disturb digestion.

HYDRARGYRI CHLORIDUM MITE.

Empirically seems to be one of the best and least irritant of the antiseptics; may be given in one-tenth of a grain doses, repeated every half hour. It is particularly indicated where a cathartic action is also desired.

CREOSOTE.

One to five minims, given in capsule or emulsion. Extremely likely to irritate the stomach.

PHENOL OR CARBOLIC ACID.

Local Action.—Irritant, but distinctly anæsthetic (depressant to the sensory nerves), and markedly germicidal in strength of 1 to 50. To the circulation in large doses it is depressant; to the respiration, at first a stimulant, later a depressant. It produces a fall of body temperature.

Carbolic acid is eliminated through the kidneys as sulphocarbonate of sodium and potassium, glyco-uronic acid, and hydrochinone. Part of it is completely destroyed in the body.

Toxicology.

Acute Poisoning.—In extremely large doses a man may drop dead very suddenly from respiratory failure. More commonly the symptoms are those of collapse, so often recorded, together with those of gastro-intestinal irritation—vomiting, pain, purging, white stains about the mouth and lips, sometimes the odor of carbolic acid on the breath, and, if the patient survives for a few days, there is marked pain in the back due to irritation of the kidney. The urine has a characteristic smoky appearance.

Treatment of the Poisoning.—Soluble sulphates have been largely used as antidotes, but are probably useless. Wash out the stomach and bowel, and give cardiac and respiratory stimulation, as has been so often recorded, with soothing drinks, such as egg albumen and acacia. Locally applied alcohol seems to be an excellent antidote; it probably acts as a diluent.

Therapeutic Applications.

Preparations.—Phenol liquefactum, dose one minim.

Uguentum phenolis, 3 per cent.

Glyceritum phenolis, 20 per cent.

Internal Uses.—In vomiting due to local irritation of the stomach phenol in two or three drop doses, well diluted in water, may be tried because of its local antiseptic action. As an intestinal antiseptic where there is considerable fermentation it may be prescribed thus:

R Sodii Bicarb., ʒi.
Phenol, m. xxiv.
Aq., fʒvi.

M. Sig:—Two teaspoonfuls in water one hour after meals.

This makes an alkaline preparation.

In the treatment of tetanus it is said to be of value given hypodermically in one-quarter minim doses every two or three hours.

For diarrhoea with fermentation it is said to be beneficial when combined with bismuth.

Local Uses.—As a mouth wash in acute infectious fevers in one-half to 1 per cent. solution.

The glycerinate of phenol may be applied directly to ulcerated areas.

In the treatment of burns one dram of phenol to six ounces of sweet oil may be used if the burn be not too extensive.

For the relief of itching it is a useful remedy, used in the form of a one per cent. ointment, or one dram to the pint of water.

Injections of carbolic acid have been used in the treatment of local suppuration, as in buboes, furuncles, etc. Ten minims of a two per cent. solution may here be used.

In 1 to 50 solution carbolic acid is a useful germicide for the disinfection of stools and urine. When applied over wounds, however, while it helps to relieve pain, it sometimes produces gangrene.

Prescriptions.—For a mouth wash:

℞ Phenol, gr. xli.
Acidī Borici, ʒi.
Menthol, gr. ss.
Alcohol, fʒi.
Aq. Menth. Pip., q. s. fʒvi.

Misce et filtra.

Sig:—Use as a mouth wash.

An ointment for itching, as in the treatment of hemorrhoids:

℞ Phenol liq., m. v.
Menthol, gr. v.
Acidī Tannici, gr. xx.
Ung. Aq. Rosæ, q. s. fʒi.

CHARCOAL.

Said to be valueless for the absorption of gas in the intestinal tract, because charcoal when moist loses its property of absorption. Empirically, however, it is apparently of some value for this purpose. It may be given in capsule in doses of 15 grains.

Preparations.—Carbo ligni (wood charcoal).

Carbo animalis purificatus (animal charcoal).

CHAPTER XI.

DRUGS USED TO DESTROY INTESTINAL PARASITES (ANTHELMINTICS.)

For the Pin Worm (*Oxyuris vermicularis*).—1. Give a free saline purge, like magnesium sulphate. 2. Give a high enema to cleanse the lower bowel. 3. Inject one pint of the infusion of quassia.

Tape Worm (*Tænia saginata*).—Starve the patient for twenty-four hours; give saline purge at night; next morning give vermifuge and follow in an hour with saline. The best drug is aspidium oleoresin, dram one-half, prescribed thus:

R Oleoresina Aspidii, fʒi.
Ol. Gaultheriæ, m. i.
Acaciæ, q. s.
Aq. Dest., fʒi.

Ft. emuls.

Sig:—Take half the bottle and repeat in a half hour.

Another drug in use is pepo (common pumpkin seed). An ounce of the ground seed may be given mixed with a little sugar and suspended in water. Turpentine in the form of the official emulsio olei terebinthinæ, one fluid dram equal to ten minims of the turpentine, may also be used.

Pelletierinæ tannas, four grains, in capsule. The active principle of punica granatum, and producing in poisonous doses paralysis of the peripheral motor nerves.

Round Worm (*Ascaris lumbricoides*).—The preceding preparatory treatment is the same as that for tapeworm. The best drug is spigelia, in the form of the fluid extract, with senna. Thus:

R Fluid extract Spigeliæ.
Fluid extract Sennæ, aa fʒi.
Syrup, q. s. fʒi.

M. Sig:—Take half the contents of the bottle and repeat in half an hour.

Oil of chenopodium 10 minims, sanatonum in the form of trochisci, santonin one-half grain.

Santonin in toxic doses produces yellow vision.

Hook Worm (*Uncinaria duodenalis*).—Thymol, thirty-grain doses in capsule.

CHAPTER XII.

DRUGS USED TO INCREASE THE APPETITE.

(STOMACHICS.)

Indications.—When loss of appetite is due to failure of the normal secretion in the stomach, this failure being caused by exhaustion from over-irritation as from alcohol or, more commonly, by atony, they increase secretion in two ways:

1. Reflexly, they stimulate by their bitter taste.
2. Directly, by their locally irritant property. They are contra-indicated in acute irritation.

NUX VOMICA.

Tincture, ten minims. Useful because bitter, and also by virtue of the general effects of strychnine, before described.

GENTIAN.

Tincture or compound tincture; dose, one dram.

QUASSIA.

Tincture, one dram; fluid extract, ten minims; contains no tannic acid.

CALUMBA.

Tincture, one dram; fluid extract, fifteen minims; contains no tannic acid.

BERBERIS.

Fluid extract, thirty minims.

CHAPTER XIII.

DRUGS USED TO EXPEL FLATUS.

(CARMINATIVES.)

The following drugs contain a volatile oil. They are locally irritant and anæsthetic, and are used as carminatives, namely, to expel flatus:

CINNAMOMUM.

Tincture, thirty minims. Aqua, flavoring vehicle, one ounce. Oleum cinnamomi, one minim. Spiritus cinnamoni, 10 per cent. of oil, minims fifteen. Pulvis aromaticus (35 per cent. cinnamon), grains ten.

ZINGIBER.

(Ginger.)

Fluid extract, ten minims; tincture, one-half dram; syrup, one dram. Oleoresin, minims two.

CARDAMOMUM.

Tincture, one dram; compound tincture, one dram.

OIL OF CARYOPHYLLUS.

(Cloves.)

Minims two.

CAPSICUM.

Fluid extract, minims five; tincture, minims twenty. Oleoresina capsici, one-half grain.

OLEUM MYRIASTICÆ.

(Nutmeg.)

Minims one to five.

OLEUM GAULTHERIÆ.

Contains methyl salicylate; dose, five to ten minims. Spiritus gaultheriæ, minims ten; oleum menthæ piperitæ, minims three; aqua menthæ piperita, ounces one; spiritus, minims ten.

The true oil should be used for internal administration; externally methyl salicylate is as effective, and much less expensive.

For a simple stomachic to relieve loss of appetite due to atony we might write:

℞ Tr. Nucis Vom.
Acid! Hydrochlorici dil., a. a. fʒss.
Tr. Gent. Comp., q. s. fʒiil.

M. et Sig:—One teaspoonful in water a half hour before meals.

The above is very bitter. The acid is added as an irritant, and also to increase the normal acidity of the stomach.

To improve the appetite in a case of alcoholic gastritis of extremely chronic type we might prescribe:

℞ Tr. Nucis Vom., fʒss.
Tr. Capsici, fʒil.
Tr. Cardamomi Comp., q. s. fʒiil.

M. et Sig:—A teaspoonful before meals.

It is a well-known fact that very irritant stomachics are indicated in alcoholic gastritis.

As a carminative in acute intestinal colic we might write:

℞ Spiriti Chloroformi, fʒss.
Sp. Menthae Piperitæ, fʒil.
Tr. Opeli Deodor., fʒil.
Elixir Aromatic., q. s. fʒiil.

M. et Sig:—One teaspoonful in water and repeat in a half hour if required.

The opium is used here simply to relieve pain.

CHAPTER XIV.

DRUGS USED TO AID DIGESTION DIRECTLY.

PEPSIN.

As enzyme obtained from the mucous membrane of the stomach of the pig, sheep, or calf. When subjected to moisture, slight acidity, and warmth it has the power of transforming proteids into peptones; in other words, it partially digests the proteid foods. Combined with hydrochloric acid in the strength of 0.2-0.4 per cent. it is active, but in much stronger solution of hydrochloric acid its power is destroyed, as it is also by strong alcoholic and alkaline solutions.

In diseases of the stomach absence of pepsin is a rather uncommon condition. Sometimes this drug seems to do good even when pepsin is present in normal amounts. It may be that pepsin produces a reflex stimulation in other parts of the digestive tract, or it may be that its own action is important. It is, however, an extremely uncertain drug.

Dose five to ten grains, best given alone in capsule, or in fresh solution with weak hydrochloric acid. The essence of pepsin N. F., dose two fluids drams, has no particular therapeutic value, save that empirically it makes a good vehicle for the iodides and salicylates, as when thus prescribed they seem to be less irritant to the stomach. In prescribing pepsin we would write thus:

R Pepsini, ʒi.
Ft. in cap. No. 12.
Sig:—One during the meal.

Or,

R Pepsini, ʒss.
Acid Hydrochloric, dil., fʒi.
Aq., q. s. fʒiij.
M. et Sig:—One teaspoonful after meals.

PANCREATINUM.

A mixture of enzymes obtained from the fresh pancreas of the hog or ox. It converts starches into dextrose, and also digests albuminoids. Its power is impaired by pepsin and by acids. It is of doubtful value in intestinal indigestion due to failure of the pancreatic ferments. It may be prescribed thus:

R Pancreatin, 3ii.

Ft. in cap. (salol coated) No. 24.

Sig:—One an hour after eating.

The salol-coated capsule is used in order that the pancreatinum may not be acted upon in the stomach.

Perhaps the most important use of pancreatin is in artificial digestion outside of the body, as in the peptonizing of milk by the use of powders commonly put up by manufacturing chemists. They contain sodium bicarbonate and pancreatin. Under the name pulvis pancreaticus compositus, N. F., an official powder is found in the National Formulary.

The powders are used in the following manner: Mix 25 grains of the powder in four fluid ounces of tepid water, take one pint of fresh cow's milk, heat it to 104° F. and add it to the mixture of water and powder; maintain the mixture at this temperature for 30 minutes; then cool and keep it cold. It should not be kept over twenty-four hours. Such a milk has a very bitter taste. If the same process be followed without heating, the milk is only partially peptonized, and there is no bitter taste.

EXTRACT OF MALT.

Dose, four fluid drams. Has considerable food value, and if it has not been heated in the process of manufacture to a temperature high enough to destroy its ferments, it aids considerably in the digestion of starches. It is usually administered during or after the meal. It is said to be extremely valuable to increase the milk of nursing women, and may be tried in cases of malnutrition with fermentation.

DIASTASE.

An amylolytic ferment prepared from malt. Will in a short time convert a hundred times its weight of starch into sugar. It is inactive in acid media, but is sometimes prescribed in combination with sodium bicarbonate. Thus:

℞ Diastasi, ʒi.
Sodii Bicarb., ʒi.

M. Ft. in cap. No. 12.

Sig:—One taken two hours after food.

It is supposed to be beneficial in intestinal indigestion due to failure of the digestion of the carbohydrates, particularly starches.

PAPAIN.

Is active in both acid and alkaline solutions at body temperature. As an aid to digestion, dose, internally, five grains. Externally it may be used in 5 per cent. solution in equal parts of glycerine and water for the digestion of membranes, as in diphtheria. It is doubtful whether it is of any great therapeutic value.

CHAPTER XV.

DRUGS USED TO INFLUENCE THE REACTION OF THE STOMACH CONTENTS.

SODIUM BICARBONATE.

Dose, grains ten to twenty. It is useful where there is gastric pain due to excessive acidity, as in true hyperchlorhydria. Here it should be administered during the greatest pain, usually an hour or two after meals. It may be prescribed thus:

R Sodii Bicarbonat., ℥i.

Ft. in chart. No. 24.

Sig:—Take in half a glass of hot water as directed.

If, however, the excessive acidity be due to organic acids, the result of fermentation, then the sodium bicarbonate had best be administered an hour or two before the meal, as it counteracts the acid, and at the same time the presence of an alkali in the stomach is believed by some to stimulate the formation of hydrochloric acid.

HYDROCHLORIC ACID.

(Acidum hydrochloricum dilutum).

Dose, ten to thirty minims. Should always be given freely diluted in water, and is best taken through a glass tube, that it may not injure the teeth. Where there is absence of acid digestion it should be given after meals. Sometimes it seems to work well if taken before the meal, acting here as a simple stomachic. We would prescribe it thus:

R Acidii Hydrochlorici dil., fʒi.

Sig:—20 drops in water one hour after food.

CHAPTER XVI.

DRUGS USED TO UNLOAD THE BOWELS.

(CATHARTICS.)

I. DRUGS USED IN ACUTE CONSTIPATION.

OLEUM RICINI.

Castor oil acts in from six to eight hours, has an extremely unpleasant taste, and produces purgation mainly by local action increasing peristalsis.

Therapeutic Uses.

1. In acute enteritis due to the retention of some irritant in the bowel it is useful because it purges and expels the irritant; secondarily, it is constipating.

2. In acute constipation, particularly in children.

Methods of Administration.—1. It may be given to adults with a small amount of whiskey. 2. It may be well mixed in sarsaparilla soda water. 3. For young infants it may be put into a spoon and simply poured in between the teeth and cheek, the child being on its back. 4. A prescription for castor oil which is fairly effectual in disguising its unpleasant taste and overcoming its tendency to gripe is the following:

℞ Ol. Ricini, fʒss.
Ol. Menth., m. ii.
Glycerin, fʒi.
Acaciæ, q. s.
Aq., q. s. fʒiil.

Ft. in emul.

Sig:—Take contents of bottle at night.

MERCURY.

There are three preparations of mercury that are used as purgatives:

Hydrargyri choridum mite (calomel), grains one to ten.

Massa hydrargyri (blue mass), grains five.

Hydrargyrum cum creta (mercury with chalk), grains five.

Mercury probably produces purgation by a local irritation of the mucous membrane of the bowel, having little effect on the stomach. It acts to some extent as an intestinal antiseptic. The green stools which sometimes follow its use are believed at present to be due to undecomposed bile, the presence of the calomel preventing the development of those organisms which decompose it normally giving a brownish color to the stool. There is no experimental evidence that calomel has power to increase the bile. It is to be remembered, however, that in cases of so-called acute catarrhal jaundice the inflammation is likely to be in the duodenum at the point where the common duct enters the bowel, and by increasing peristalsis, by expelling the cause of the inflammation, and by its antiseptic action calomel may have some curative effect on this condition. It is probably best given in small, frequently repeated doses. Thus:

R Hydragryi Chlor. Mitis., gr. i.
Ft. in pil. No. 10.
Sig:—One every half hour.

It is well to remember that, in rare cases, even so small a dose as this may produce ptialism, that is, salivation, therefore if the drug does not produce free purgation the next morning it had best be followed by a saline. Thus:

R Magnesii Sulphatis, ʒii.
Sig:—Take in a glass of hot water.

Calomel is sometimes given in one large dose, as is blue mass, or mercury and chalk. Each may be prescribed in five-grain doses in capsule. They are used for practically the same purposes as is calomel.

MAGNESIA.

Magnesium oxide; dose, thirty grains. It is also used in the form of magnesii oxidum ponderosum (dose, thirty grains) or heavy magnesia oxide. It differs mainly from light magnesia because when mixed with water it does not form gelatinous hydroxide.

Magma Magnesiae, N. F. (milk of magnesia).—A suspension in water of magnesium hydroxide; dose, two fluid drams.

Magnesium Carbonate.—Dose, forty-five grains.

Therapeutic Application.

The above preparations should not be confounded with magnesia sulphate or citrate, which are much more powerfully laxatives. Magnesia, as above described, is a very mild laxative, and only active in the presence of acidity. Therefore, in cases of marked hyperacidity with mild constipation, particularly in children, two to four drams of magma magnesiae, N. F., may be given. Its purgative action may be increased by following the dose with a glass of lemonade.

II. DRUGS USED IN CHRONIC CONSTIPATION.**RHUBARB.**

Preparations.—Tincture rhei, one fluid dram.

Tinctura rhei aromatica, thirty minims.

Syrupus rhei aromaticus, two drams.

Therapeutic Application.

This drug requires about eight hours to purge. The aromatic preparations are very pleasant to take and are easily given to children. The drug is, however, likely to be followed by secondary constipation.

RHAMNUS PURSHIANA (Cascara).

Preparations.—Extract rhamni purshianæ, one to five grains in pill.

Fluid extract rhamni purshianæ, ten to thirty minims.

Fluid ext. rh. purshianæ aromat., ten to thirty minims. (This preparation is tasteless, but in practice appears to be much weaker than the ordinary fluid extract.)

Fluid extractum rhamni purshianæ alkalinum, N. F.; dose, ten to thirty minims. This is apparently a better acting preparation than the aromatic, and is also without unpleasant taste. By increasing peristalsis and local irritation this drug produces purgation in about eight hours. There is less secondary constipation than after any other known cathartic. The anthracene purgatives (rhubarb, senna, aloes, and cascara) do not purge until their active principles have been oxidized by the intestinal secretions, hence

they must act on the lower portion of the intestinal tract, and are slow.

PHYSOSTIGMA.

Preparations.—Physostigminæ, or eserine sulphate or salicylate is most commonly used. Dose, one-fiftieth of a grain.

Physiological Action.

Local Action.—Irritant.

Brain.—No action.

Reflex Arc.—Depresses motor side of spinal cord.

Pupil.—Marked contraction, peripheral.

Circulation.—Slight stimulant to heart muscle and lessens its rate by stimulating the peripheral end of the pneumogastric.

Special Action.—This drug is a powerful stimulant to all muscle structure, particularly involuntary muscles; therefore, greatly increases peristalsis.

Therapeutic Applications.

Used as a miotic by the oculist, particularly in the treatment of glaucoma. Possibly of slight value in the treatment of spinal convulsions because it depresses the motor side of the spinal cord. Its most important use in general medicine is in the treatment of chronic constipation due to atony, and also sometimes in acute paralysis of the bowel after an operation or in the course of typhoid fever.

ALOES.

Preparations.—Aloe purificata, grains four.

Tinctura aloes, minims thirty.

Aloinum (active principle of aloes), grain one.

Aloes requires about eight hours to purge; is very likely to gripe; a very effective cathartic, though somewhat likely to produce secondary constipation. It is believed by some that it induces congestion of the pelvic viscera, particularly in women, and is, therefore, contra-indicated in pregnancy.

PODOPHYLLUM.

Podophyllum, grains five.

Preparations.—Resina podophylli (podophyllin), one-tenth to one-quarter of a grain.

Podophyllum requires from six to eight hours to act. In large dose it causes severe griping, but in small dose is a useful laxative. It was long believed to have a direct action on the liver, increasing the flow of bile, but this is doubtful.

SENNA.

A drug found in many proprietary cathartics; causes considerable griping; takes about six to eight hours to act; is eliminated to some extent through the milk of nursing women, should, therefore, be avoided if a mother is nursing her child. Senna is likely to stain the urine red or, more commonly, an abnormal yellow.

Preparations.—Fluid extractum sennæ; dose, one or two drams.

Confectio senna, one-half dram.

It is pleasant to take, but is likely to cause griping and disturbance of the stomach.

Infusum senna compositum (black draught); a dose of four ounces, containing senna, manna, and magnesium sulphate, is a powerful purgative.

Syrupus sennæ, two drams.

Pulvis glycyrrhizæ compositus (compound liquorice powder), contains senna, liquorice, oil of fennel, and sulphur; dose, thirty grains. This is the most popular preparation of sennæ.

SULPHUR.

Preparations.—Sulphur sublimatum is a form in which the sulphur has been volatilized and recondensed to rid it of impurities—sometimes called flowers of sulphur.

Sulphur lotum, or washed sulphur, is simply sublimed sulphur which has been cleansed from its impurities, particularly from sulphuric acid.

Sulphur præcipitatum is made from sublimated sulphur by the action of lime, hydrochloric acid, and water. It is simply a very finely divided sulphur, and is sometimes called milk of sulphur.

Physiological Action.

It has a selective action, somewhat irritant to the skin; is a powerful parasiticide, and a mild cathartic.

Therapeutic Application.

Internally sulphur is used as sulphur precipitatum, useful in constipation associated with hemorrhoids, and a very old remedy in the treatment of chronic rheumatism, though of questionable value. It is said by some to be efficacious in the treatment of chronic bronchitis.

Sulphur is the most useful local remedy we have for the common parasites of the skin—ringworm and scabies.

Unguentum sulphuris, U. S. P. (15 per cent.), may be used for this purpose, applied each night, at least three times a week, and preceded by a hot bath. Sulphur is also valuable in certain diseases of the skin other than parasitic, such as chronic eczema, psoriasis, and acne.

As a laxative sulphur must be given in doses of one to two drams; for other purposes internally as an alterative, ten to twenty grains.

FEL BOVIS PURIFICATUM.

Dose, ten grains. Experimentally bile has been demonstrated to be the most effective substance to increase the flow of bile, provided there is no mechanical obstruction in the ducts; but the absence of sufficient bile in the intestinal tract, from any cause save obstruction is rather rare. This drug may be tried as a laxative in chronic constipation, combined with other cathartics or given alone, and may also be used where the digestion of fats is poor. It should be given two hours after meals.

PHENOLPHTHALEIN.

This substance has lately come into use as a laxative in one-grain doses.

PETROLATUM LIQUIDUM.

This is useful in chronic constipation, acting mechanically. As it is slowly absorbed, it lubricates the intestinal contents. The dose is one to four drams.

III. CATHARTICS WHICH PRODUCE WATERY STOOLS (Hydragogues).

THE SALINES.

Magnesium sulphate (Epsom salts), one to four drams in water with lemon juice.

Magnesii sulphas effervescens, one to four drams.

The most powerful of the salines, and the most unpleasant to take; the effervescent preparation is the more palatable.

Potassii et sodii tartras (Rochelle salts), two drams.

Pulvis effervescens compositus, Seidlitz powder; dose, one set of two powders.

The blue paper contains sodium bicarbonate and Rochelle salts, the white paper, tartaric acid.

Rochelle salts is a little milder and a little more agreeable to take than Epsom salts.

Sodium sulphas (Glauber's salt); dose, one to two drams; little used alone, but forms a constituent of the laxative saline waters, such as Carlsbad or Hunyadi water.

Pulvis salis carolini factitii effervescens (effervescent artificial Carlsbad salt, N. F.); dose, a heaping teaspoonful, say one dram, in a glass of water. This is not so disagreeable to take as ordinary saline and is mildly laxative.

Sodium phosphate, dose one-half to one dram is a mild saline laxative, and is supposed to have some stimulant action on the liver, but this is very doubtful.

Liquor sodii phosphatis compositus, dose two drams, is a solution of sodium phosphate containing sixty grains to the fluid dram. This is a convenient form of giving sodium phosphate; but unless the preparation be very carefully made and kept in a warm place the sodium phosphate goes out of the solution..

Physiological Action.

If any of these substances are injected into the blood in large quantities they act as depressant poisons, but when given by the mouth to produce catharsis so little is absorbed that they are non-toxic. They are not very irritating, but produce purgation largely by increasing the amount of water in the bowel. This they do in three ways:

- (a) By giving them diluted with large quantities of water.
- (b) By their so-called salt action; that is, when there is within the bowel a concentrated solution of a salt, there is a tendency on the part of the blood and lymph to give up some of their water to the intestine to dilute the concentrated saline solution.
- (c) Under these circumstances absorption from the bowel is lessened.

All of the salines are more or less disturbing to the stomach. They require from one to four hours to act, and are usually administered in the morning. If the plain saline is given it is administered in very hot water; if the effervescent preparations are used they are given in cold water.

Therapeutic Applications.

To get rid of any irritant in the bowel; often used after calomel in acute enteritis.

To aid in the elimination of toxic substances from the general system, as in uræmia, chronic lead poisoning, and often in the acute infectious fevers.

To aid in the elimination of dropsical fluid, as in Bright's disease, and disease of the heart or liver when associated with œdema. They should be administered in saturated solution, this having a greater power to draw fluid from the tissues.

In using the salines for any purpose it is to be remembered that they are depleting and exhausting; therefore, in cases where the circulation is weak they should be used cautiously.

ELATERIUM.

One-sixth of a grain. Active principle, *elaterin*, one-twentieth of a grain. *Trituratio elaterini*, one grain.

Physiological Action.

Locally.—Somewhat irritant; it is the most powerful hydragogue purge we have, producing a true inflammatory exudate.

Therapeutic Application.

Used almost entirely for the relief of dropsical effusions and to aid in the elimination of toxins; usually prescribed in pill.

JALAP.

Preparations.—Pulvis jalapæ compositus, dose thirty grains, contains thirty-five parts of jalap and sixty-five parts of bitartrate of potassium.

Resinæ jalapæ, two grains.

Therapeutic Application.

For the same general indications as elaterin. It is supposed by some to have a specific action on the liver. It is not so powerful as elaterin, but is very likely to gripe and to disturb the stomach, and must, therefore, be avoided in acute irritations of the gastro-intestinal tract.

COLOCYNTH.

Preparations.—Extractum colocynthis, one-half to one grain.

Extractum colocynthis compositum, five grains; this contains aloes and scammony.

Colocynth is hardly ever used alone, but in combination with other drugs to produce watery stools; is locally irritant; acts in about six to eight hours.

RESINA SCAMMONI.

Five grains. An irritant hydragogue purge that is not much used except in combination.

GAMBOGE.

Important only because it is one of the constituents of pil. cathartic comp., containing extract colocynthis comp., grains one and one-third; hydrargyri chloridii mitis, one grain; resinæ jalapæ, one-third of a grain; gamboge, one-quarter of a grain. Dose, one or two pills, usually given at night. It produces a rather watery stool and is very likely to gripe. Used in subacute constipation, but should not be given for long periods of time. It is generally better to avoid these set combinations.

GENERAL MANAGEMENT OF CHRONIC CONSTIPATION.

1. Regular time for stool.
2. The drinking of large quantities of water.
3. Regular exercise.
4. Laxative foods, like olive oil, or better, liquid petrolatum, because less is absorbed, fruit, and green vegetables. When drugs have to be used the following are a few types of prescription:

℞ Tinct. Nucis Vom., fʒii.
Tinct. Bellad., fʒi.
Fluid Extract Rhamni Purshianæ, fʒss.
Elixir Aromatis, q. s. fʒiii.

M. et Sig:—A teaspoonful three times a day after food in water.

If patients markedly object to the taste we may write:

℞ Extract Rhamni Purshianæ, gr. xxiv.
Extract Belladonnæ, gr. i.
Strych. Sulph., gr. ¼.

M. et Ft. in pil. No. 12.

Sig:—One at night.

Or, again, in obstinate cases, where peristalsis is very sluggish we could write:

℞ Aloin, gr. iii.
Resinæ Podophylli, gr. ii.
Extract Hyoscyami, gr. i.
Physostigminæ Salicyl., gr. ¼.
Ol. Caryophyl., m. ii.

Mis. et Ft. in pil. No. 12.

Sig:—One at night.

The addition of one of the aromatic oils, such as caryophyllus to a cathartic pill seems to lessen the irritation yet not interfere with the action of the cathartic. **Physostigmina** should be remembered as a powerful stimulant to peristalsis. As a rule, some preparation of belladonna or hyoscyamus is added to these purgatives to counteract their tendency to gripe. It is fairly well-established empirically that drugs of this class generally work better in combination than when given alone. In prescribing for children it is very difficult to get them to take pills or to swallow liquids of unpleasant taste. In more or less acute cases

where we wish to unload the bowel, minute doses of calomel flavored with oil of wintergreen are useful. Thus:

℞ Hg. Chlor. Mit., gr. ss.
Ol. of Gautheriæ, m. i.
M. Ft. in pill. No. 6.
Sig:—One every half hour.

Children will usually swallow compound liquorice powder without objection. *Pulvis glycyrrhizæ compositus*, dose for a child of ten years, twenty grains.

Syrupus rhei aromaticus, dose for a child of ten years, one-half to one dram.

Liquor magnesii citratis, dose one to two ounces.

METHODS OF PRESCRIBING WHEN WE WISH TO PRODUCE WATERY STOOLS.

All the salines tend to disturb the stomach.

℞ *Magnesii Sulphatis*, ʒi.
Sig:—Two tablespoonfuls in a glass of hot water each morning.

The unpleasant taste may be relieved to some extent by the addition of a little lemon juice; or,

℞ *Magnesii Sulph. Effervesc.*, ʒi.
Sig:—Two teaspoonfuls in a glass of cold water each morning.

The effervescent preparations of the salines contain sodium bicarbonate, tartaric and citric acids, all of which are somewhat laxative.

The other salines may be prescribed in the same way, but if we wish to use Rochelle salts in effervescent form we have the common seidlitz powder (see under *potassii et sodii tartras*). Both powders should be placed in water and allowed to effervesce and then swallowed.

CITRATE OF MAGNESIA.

Usually prescribed in the form of *liquor magnesii citratis*, is the most pleasant of all the salines, but is not nearly as effective as Epsom salts. The liquor can be given in doses of from six to

twelve ounces, tastes very much like lemonade and is very agreeable, particularly to children.

ELATERIN.

As has been said, the most powerful vegetable substance producing watery stools is elaterin. Its effectiveness is often increased by combining it with other cathartics. Thus:

℞ Elaterin, gr. $\frac{1}{2}$.
Ext. Colocynthis Comp., gr. 11.
Ext. Bell., gr. 1.
Ol. Caryophyl., m. 11.
M. et Ft. in pil. No. 12.
Sig:—One at night.

OLEUM TIGLII (CROTON OIL).

The dose is one or two minims in a teaspoonful of olive oil. This is a very powerful, drastic, irritant cathartic which acts in about one hour or less, and is used when the patient is unconscious or in great emergency, as in some forms of poisoning. In very minute doses (one-twentieth of a minim) is sometimes added to pills in chronic constipation, but this is rarely necessary.

CHAPTER XVII.

DRUGS USED TO INFLUENCE THE URINE.

I. TO INCREASE THE AMOUNT OF URINE.

Water.

This is by far the most important hydragogue diuretic, and it has the great advantage of being non-irritant. The chief guide as to whether or not a man is getting enough water is the amount of urine he is passing in the twenty-four hours. A normal individual should pass from 40 to 50 ounces in the twenty-four hours, and in acute diseases this amount can often be increased with advantage to 75 or 100 ounces. If there is dropsy, or if the blood pressure is very high, we must be guarded in our use of water.

Caffeine.

The physiological action of this substance has already been discussed. If there is dropsy, due to cardiac or hepatic disease, this substance is useful because of its stimulant action upon the kidney; but if the patient suffers from insomnia or delirium it must be avoided. Under these circumstances, with little or no disease of the kidney, we can use one of the following substances:

Diuretin.

This drug is composed of salicylate of sodium and theobromine.

Theobromine is an alkaloid found in *theobroma cacao*, and the above salt is used because of its greater solubility. Dose, grains ten. It probably produces diuresis by dilating the blood-vessels in the kidney. It is said to be more active than caffeine because though caffeine dilates the renal vessels, this action is to some extent counteracted by its power to cause general vasomotor constriction, which theobromine does not have.

Theophyllin.

This is an alkaloid found with caffeine in tea, but lacking the stimulant action on the brain of caffeine. The natural alkaloid is seldom used internally, but theocin, synthetic theophyllin, is given; dose, grains five. Also acet-theocin sodium is sometimes used, as it is least likely to disturb the stomach; dose, grains five.

Squill.

Preparations.—Pulvis scillæ; dose, grain one.

Fluid extractum scillæ; minims, one to two.

Syrupus scillæ; dram, one-half.

Syrupus scillæ comp. contains one grain of tartar emetic to the ounce; dose minims thirty.

Squill has much the same effect on the circulation as has digitalis. It is chiefly used, however, for its extreme irritant action on the kidney, but should be avoided if the kidney be diseased. As a diuretic the best preparation is powdered squill.

Calomel.

(Hydrargyri chloridum mite) may be used as a diuretic in one or two grain doses three times a day. It should be used most cautiously, however, because it is likely to produce salivation. Strophanthus and digitalis are diuretic chiefly because they stimulate the heart and increase the blood supply to the kidney (see discussion under these drugs).

Scoparius.

Contains spartein and scoparine. The fluid extract of scoparius (not official) may be given in doses of one-half dram. Spartein sulphate, grain one-quarter. These preparations are of doubtful value in the treatment of cardiac dropsy, but are said to increase the flow of urine and stimulate the heart.

Apocynum Cannabinum.

Fluid extract, minims twenty. Extremely irritant to the gastrointestinal tract; of slight value as a cardiac stimulant and diuretic.

Practical Application of Diuretics.

For the relief of heart weakness, associated with dropsy, we might write:

℞ Scilla, gr. xxiv.
Digitalis, gr. xxiv.
Caffein, gr. xxiv.

M. Ft. in cap. No. 24.

Sig:—One three times a day after food.

or,

℞ Theocin, ʒi.
Pulveris Digitalis, gr. xii.

M. Ft. in cap. No. 12.

Sig:—One after each meal.

In Acute Kidney Disease.

Here the efficacy of drugs is very limited. If there is no dropsy or other contra-indication water is the most valuable remedy. The potassium salts, particularly potassium citrate or acetate, twenty grains three times a day, are valuable; first, because these salts to some extent increase the amount of urine simply by changing the osmotic pressure; and, second, because they tend to clear the kidney of casts and cellular elements that may have collected in it. They are not particularly powerful, however. We might write thus:

℞ Potassii Citratia, ʒi.
Syrup. Ac. Citrit., ʒʒiij.
Aq., ʒʒiij.

M. Sig:—One teaspoonful every 2 hours in water.

Liquor Ferri et Ammonii Acetatis.

(Basham's Mixture.)

Dose, two fluid drams. Supposed to be useful in acute nephritis associated with anæmia, but it is of rather doubtful value.

In Chronic Kidney Disease.

The first class of drugs is sometimes of value here, but must be used with great caution. The decidedly irritant substances, such as oil of turpentine (ol. terebinthinæ), minims five, and tr. of cantharides, minims five, are of doubtful value, because they

are powerful irritants and likely to increase the disease of the kidney already present.

II. DRUGS USED TO INCREASE THE ACIDITY OF THE URINE.

Boracic acid; grains ten.

Benzoic acid; generally used in the form of sodium benzoate; grains five.

Salicylic acid; grains five.

To correct an alkaline urine we might write:

R Acidl Borici, ʒi.
Sodii Benzoatis, ʒi.

M. Ft. in cap. No. 12.

Sig:—One after each meal.

III. DRUGS USED TO LESSEN THE ACIDITY OF THE URINE.

Sodium bicarbonate; grains twenty.

Sodium carbonate; grains ten.

Potassium citrate; grains twenty.

The same prescription of potassium citrate as before given would apply here. The dose can be increased until the desired reaction of the urine is produced.

IV. DRUGS USED AS URINARY ANTISEPTICS.

When we have cystitis, or inflammation of the bladder, the urine is nearly always alkaline. All the drugs that have been considered which tend to render the urine acid are also to some extent antiseptic. Two others of importance are phenol salicylas, grains five, mentioned and described under the intestinal antiseptics.

Hexamethylenamine.
(Urotropine.)

Grains five. This substance is the most powerful antiseptic we have. It probably acts best in an acid urine, its activity depending on the fact that it sets free formaldehyde. It is distinctly irritant to the genito-urinary tract if used for long periods of time. It may well be prescribed thus:

R **Acidi Borici, 3i.**
Hexamethylenaminæ, 3i.
M. Ft. in cap. No. 24.
Sig:—Two capsules 3 times a day after food.

V. DRUGS USED AS SEDATIVES TO THE GENITO-URINARY MUCOUS MEMBRANE.

Tincture of belladonna, minims ten.

Tincture of hyoscyamus, minims ten.

Where the irritation is due to infection, hyperacidity, or anacidity the drugs already discussed are indicated, but where the bladder itself is irritable, as is often the case in children who suffer from incontinence of urine during sleep, the tincture of belladonna is very useful given thus:

R **Tr. Belladonnæ, fʒi.**

Sig:—Five drops in water at night, increasing one drop at each dose.

The drug may be thus increased until the condition is controlled, or until it produces dryness of the throat or the other symptoms already mentioned as indicating the therapeutic limit of the drug.

VI. DRUGS USED IN SUBACUTE AND CHRONIC INFLAMMATION OF THE GENITO-URINARY TRACT.

In chronic urethritis, cystitis or ureteritis the following drugs are of some value, but these inflammations are commonly treated by local means. For subacute conditions we may use the fluid extract buchu, dram one-half, or the fluid extract uva ursi, dram one-half.

In more chronic states, oleoresina copaiba, grains five; fluid extract cubebæ, minims fifteen; oleum cubebæ, minims five.

In very chronic conditions, as in gleet, we may use tr. of cantharides, minims ten; oil of turpentine, minims ten, or oil of sandalwood (oleum santali), minims five to ten. By many the latter is considered far the best.

These oils may be prescribed in capsule or in emulsion. We may write:

℞ Oleoresina Cubebæ, ʒii.
 Ol. of Caryophyl., m. ii.
 Acaciæ, q. s.
 Aq., q. s. fʒiij.

M. Ft. emulsio.

Sig:—One dram in water 3 times a day after food.

or,

℞ Oleis Santali, fʒi.
 Ft. in cap. No. 12.
 Sig:—One after each meal.

Piperazine.

Dose, five grains. Supposed to be beneficial in the treatment of urinary calculi. Varying results have been reported from the use of the drug, and its value is by no means established.

CHAPTER XVIII.

DRUGS USED TO PRODUCE VOMITING.

APOMORPHINE.

An alkaloid prepared artificially from morphine.

Apomorphine Hydrochloride.—Dose, one-twentieth to one-tenth of a grain. It is very likely to decompose and should, therefore, always be used fairly fresh. When decomposed it is of a greenish color; the fresh preparation is white or very light yellow.

Physiological Action.

Locally it is irritant. On the nervous system and circulation it has no important effect save that in very large doses it is depressant. To respiration it is a stimulant, being, therefore, in marked contrast to morphine.

On the vomiting centre its most important physiological action is stimulation which causes emesis, whether given hypodermically or by the mouth. It also tends to increase the secretions, particularly of the mucous membrane of the respiratory tract, as do almost all substances that produce nausea.

Therapeutic Application.

As an emetic to unload the stomach; useful for almost all forms of poison that have been taken by the mouth, and particularly useful in acute alcoholism, producing very free vomiting which is usually followed by relaxation and sleep; it can be given hypodermically in the form of apomorphine hydrochloride, grain one-tenth. Some insist that it has a decidedly depressing effect on the circulation.

As an expectorant in acute bronchitis. Here it is used in doses of one-twentieth of a grain, generally in solution by the mouth. We might write:

R Apomorphinæ Hydrochlorid., gr. i.
Aq., q. s. ℥iil.

M. Sig:—One teaspoonful every 3 hours.

IPECACUANHA.

Preparations.—Fluid extractum ipecacuanhæ, fifteen minims as an emetic, one minim as an expectorant.

Pulvis ipecacuanhæ, as an expectorant one grain.

Pulvis ipecacuanhæ, as an emetic fifteen grains.

Syrupus ipecacuanhæ, as an expectorant fifteen minims.

Syrupus ipecacuanhæ, as an emetic one fluid dram.

Tinctura ipecacuanhæ et opii contains one grain of opium and one grain of ipecacuanhæ to ten minims.

Pulvis ipecacuanhæ et opii, of the same strength as the tincture, ten grains.

The two last preparations are used as diaphoretics.

Physiological Action.

Locally.—Decidedly irritant; produces copious vomiting, both by central and local action, and in large doses nausea, vomiting, and bloody purging, with collapse.

The **treatment** is to wash out the stomach with the stomach tube and to use opium to control the vomiting and purging, together with general stimulation.

It contains a combination of active principles known as emetine, which at present is used in practical medicine to some extent in the treatment of amebic dysentery.

Therapeutic Uses.

As an **emetic** to empty the stomach, in children it is probably best given in the form of a syrup, one-half dram repeated every half hour until emesis is produced. It is sometimes used in spasmodic croup in children for the purpose of producing emesis and ridding the throat and larynx of mucus.

As an **expectorant** in acute bronchitis when the cough is harsh and dry it is one of the most effective remedies, increasing the amount of mucus, and in this way lessening the irritation. This increase of mucus is due to the fact that all drugs which nauseate tend reflexly to increase the secretions in the bronchi.

To Induce Sweating.—It is used in the form of Dover's powder in the early treatment of coryza and bronchitis (see under opium.)

In the Treatment of Dysentery.—Ipecacuanha is a very old remedy in the treatment of this disease, particularly of the tropical type. It is commonly given in five-grain doses, repeated every few minutes until nausea is produced. Combined with morphine or opium it is less likely to produce vomiting. Some assert that the result of this treatment is the production of tarry, green stools, when the use of the drug should be discontinued.

As an Antiemetic to Stop Vomiting.—When vomiting is due to exhaustion of the stomach and complete failure of the digestion, one or two drops of wine of ipecacuanha repeated every few minutes will sometimes give relief.

As a Stomachic.—In marked loss of appetite due to atony, ipecacuanha is sometimes added to stomachic mixtures. Thus:

R Tr. Nucis Vom., ℥ss.
 Vinum Ipecacuanhæ, ℥iij.
 Tr. Gentian Comp., q. s., ℥iij.

M. Sig:—One teaspoonful 3 times a day before meals.

ZINC SULPHATE.

An emetic which acts peripherally only, and is used simply to empty the stomach; one of the best drugs, therefore, for this purpose. Dose, 15 to 20 grains.

MUSTARD.

(*Sinapis alba* and *nigra*.)

Sinapis is most commonly used; a fairly certain peripherally acting emetic, containing an extremely irritant oil, the oil of mustard (*oleum sinapis*), and producing emesis promptly. From two to four drams of powdered mustard may be given in a glass of warm water. When it causes vomiting, the patient is often left with marked irritation of the nasopharynx.

In the reflex convulsions of children the mustard bath is often beneficial; two to four teaspoonfuls of the dry powder in each gallon of water.

In the form of a plaster, mustard is a useful counter-irritant to relieve pain. Here it is diluted, mixed with an equal part of flour, made into a paste with a little water, and applied on gauze or paper. It should not be heated above 140° F., nor be left on the skin more than half an hour.

COPPER SULPHATE.

Grains five. Should never be used as an emetic save in the treatment of phosphorus poisoning, for which it is the antidote. In minute doses, one-tenth to one-half a grain, it may be tried as an intestinal antiseptic.

Uses of Emetics.

First, to unload the stomach.

Second, to expel foreign bodies from the throat and larynx.

Emetics should be avoided in the following conditions:

In marked congestion of the brain, in hernia, in pregnancy, and when there is extreme irritability of the stomach.

CHAPTER XIX.

DRUGS USED IN THE TREATMENT OF VOMITING.

CERII OXALAS.

Dose, five grains. Said to be of value in the treatment of reflex vomiting.

ACIDUM HYDROCYANICUM.

Preparation.—Acidum hydrocyanic dilutum (2 per cent.); dose, five minims.

Physiological Action.

Locally.—Markedly depressant to the peripheral sensory nerves.

Depressant to the heart; ultimately depressant to the respiration. Destroys the hæmoglobin of the blood; is very rapidly absorbed, also rapidly destroyed in the body. It is a powerful poison to all living tissue.

Toxicology.

An overwhelming dose produces a momentary convulsion and almost instant death. If life is prolonged the pulse becomes slow, and there is absolute asphyxia. There may be general convulsions, with marked cyanosis, exophthalmos, and bloody froth at the mouth; sometimes the characteristic odor like that of bitter almonds may be detected. If the patient lives a half hour recovery usually takes place. Peroxide of hydrogen or permanganate of potash may be tried as antidotes. The treatment is purely symptomatic.

Therapeutic Application.

This drug has been largely used in the treatment of cough because of its depressant action on the peripheral sensory nerves when locally applied. It is valuable in the treatment of vomiting due to irritation of the mucous membrane, and will sometimes relieve itching when locally applied, but must be used with care.

Other drugs, already discussed in the treatment of vomiting, are cocaine, ipecacuanha, and the bromides.

CHAPTER XX.

DRUGS USED IN BRONCHITIS.

I. SEDATIVE EXPECTORANTS.

In the early stages, when there is a harsh, dry cough, the so-called sedative expectorants are indicated. As has already been stated, the sedative expectorants increase the amount of mucus, and the mucus acts as a sedative to the inflamed mucous membrane. These drugs are the emetics in small doses, such as:

Apomorphine hydrochloride, grain one-sixteenth.

Syrup of ipecacuanha, minims fifteen.

Antimonii et potassii tartras (Tartar emetic), grain one-tenth.

This latter drug is a profound general depressant and a local irritant. It depresses the respiration and the heart muscles, also first the sensory, later the motor cord. Its use as an emetic, therefore, has largely been discontinued, and at present it is mainly employed as a sedative expectorant.

Toxicology.

It is not an uncommon form of poisoning, being sometimes used by the laity to overcome the alcohol habit by producing vomiting. The symptoms are nausea, abdominal pains, vomiting, and purging. Both the vomitus and stools soon become expulsive in character, and closely resemble the rice water discharges seen in Asiatic cholera. The skin at first is moist and warm, later cold and dry; the pulse becomes rapid and weak; the respiration rapid and shallow; the pupils dilate; there is great thirst and a tremendous loss of body weight, so that the patient may become suddenly emaciated and die in a few hours from the great loss of water. The pulse may disappear at the wrist, the patient, as a rule, being still conscious; the reflexes are usually lessened, though sometimes convulsions occur, due to cerebral anæmia.

Treatment of Tartar Emetic (Antimony) Poisoning.

Give thirty grains of tannic acid in water; wash out the stomach with a stomach tube and tannic acid solution; use normal

salt solution hypodermically, stimulating the circulation freely, as before detailed; give morphine hypodermically in one-quarter grain doses to control the vomiting, purgation, and pain.

POTASSIUM CITRATE.

This drug is often combined with one of the sedative expectorants, and may possibly do good by rendering the mucus more fluid. We might write in the early stages of bronchitis:

R Syrup Ipecacuanhæ, ℥℥i.
Potassii Citratis, ℥ss.
Syrup. Ac. Citric, ℥℥i.
Aq., q. s. ℥℥i℥i.

M. Sig:—One teaspoonful every 2 hours.

This prescription should be stopped if nausea is produced.

II. THE COUGH SEDATIVES.

This group must not be confounded with the sedative expectorants. The cough sedatives allay cough. Some of them tend to lessen secretion. They act either by depressing the respiratory centre or the peripheral nerve endings in the lungs. They are:

Opium itself, grain one-half.

Morphine sulphate, grain one-eighth.

Codeine or codeine sulphate, grain one-quarter to one-half.

Heroin, grain one-twelfth.

The bromides (sodium, ammonium, or potassium), grains ten to twenty.

Tr. of belladonna, minims five.

Tr. of hyoscyamus, minims five.

These drugs are indicated when there is cough of reflex irritant type, as in laryngitis or in tuberculosis of the lungs and bronchitis when the cough is far in excess of the expectoration, and keeps the patient awake at night. Their use, however, should be strictly avoided if the cough is associated with free expectoration, as the cough brings up the exudate. To control an irritating cough we might write:

R Codein, gr. ℥i.
Sodii Bromidi, ℥ss.
Aq. Cinnamomi, q. s. ℥℥i℥i.

M. Sig:—One teaspoonful every 2 hours.

The drugs in the above prescription may appear to be incompatible, as the bromides usually cannot be combined with the alkaloïds. But codeine is soluble in 120 parts of water, and if carefully compounded this formula will make a clear solution. Do not, however, substitute codeine sulphate, the salt, for codeine itself.

LOBELIA.

Tincture, fifteen minims; as a sedative expectorant, one dram. As an emetic this drug is not much used in medicine at present, but is a fairly common cause of poisoning.

Physiological Action.

In large doses it is a universal depressant, and is believed to be a special paralyzant to the peripheral motor nerves.

Toxicology.

The symptoms are nausea and vomiting; lessened reflexes; great muscular weakness; rapid respiration; rapid feeble pulse, though at first it may be rather slow; cold clammy skin.

The treatment is free stimulation; the application of external heat; the use of opium and possibly tannic acid.

Therapeutic Application.

The drug has been largely used in the treatment of asthma in doses of ten minims, which are increased. As to its value there is much difference of opinion. It is said, however, to have but little effect save in almost toxic doses. It should be used with great caution.

GELSEMIUM.

Tincture of gelsemium, ten minims.

Physiological Action.

Depressant to the spinal cord, the circulation, and the respiration. Dilates the pupil peripherally.

Symptoms of Poisoning.—Those chiefly to be remembered are ptosis and dropping of the jaw, sometimes internal squint;

the voice may be lost. The other symptoms are depression; lessened reflexes; rather shallow respiration; fall of body temperature; cold and clammy skin.

Treatment of Gelsemium Poisoning.

Free circulatory and respiratory stimulation, with the use of the stomach tube or emetics, as before described, and the application of external heat.

Therapeutic Application.

The drug has been used in the treatment of headache and is said to be valuable combined with cannabis indica. We might write:

R Fluid extract Cannabis, Indicæ, m. xiv.
Tr. Gelsemii, fʒiij.
Elixir Aromatic, q. s. fʒiij.

M. Sig:—One teaspoonful every 3 hours in water.

The above may be tried, but is of doubtful efficacy. It has been used in the treatment of asthma, whooping cough and spasmodic croup, also a little as a mydriatic in the strength of eight grains to the ounce.

CONIUM.

Conium, fluid extract, minims two. Coniine is the active principle. Coniine hydrobromide, 1/60 of a grain.

Physiological Action.

Depresses the peripheral motor nerves and is slightly depressant to the spinal cord; depresses the heart and the respiration, mainly by its action on the peripheral motor nerve trunks. It is very little used in medicine.

Toxicology.

It produces ptosis, staggering gait, and marked respiratory and circulatory weakness.

The treatment is to empty the stomach and stimulate the heart and respiration. (See poisoning by chloral.)

STRAMONIUM.

Stramonium contains daturine, practically identical with atropine; fluid extract, five minims; tincture, fifteen minims; unguentum stramonii.

The drug is used practically for the same purposes as belladonna, but is not as effective. Daturine is hardly ever used in medicine. The dose is 1/200 of a grain.

III. THE STIMULATING EXPECTORANTS.

The meaning of this term is very commonly misunderstood, largely because it is defined in two ways; first, the stimulating expectorants may include those drugs which stimulate the respiratory centre, such as strychnine and ammonia, thus increasing the cough and stimulating expectoration. More commonly, however, we understand the stimulating expectorants to be those drugs which stimulate the mucous membrane of the bronchi, and restore its normal tone. Following every acute inflammation there is a state of relaxation which is associated with a transudate, a thin serous fluid, oozing from the blood vessels and lymphatics. This relaxed condition is, to some extent, relieved by the irritant action of the stimulating expectorants. Therefore it must be understood that stimulating expectorants do not increase, but decrease, expectoration. Clinically, and, as a rule, drugs of this class are very unsatisfactory, and are all likely to disturb the stomach. Under the heading of drugs used to influence the mucous membrane of the genito-urinary tract have been given practically the same substances as those we are now discussing, because when circulating in the blood they act alike on all of the mucous membranes.

AMMONII CHLORIDUM.

Physiological Action.

Locally.—Irritant.

Circulation.—Slightly stimulant.

Therapeutic Application.

This drug is very commonly used in subacute bronchitis when the expectoration becomes free. It tends to irritate the relaxed

mucous membrane, and to some extent lessens, therefore, the transudate into the bronchial tubes. It is also a slight stimulant to the respiration, thus helping the patient to get rid of the exudate by coughing. It is generally prescribed with a compound licorice mixture. Thus:

R Ammonii Chloridi, ʒi .
 Mixture Glycyrrhizæ Comp., ʒʒi .
M. et Sig:—One teaspoonful every two hours.

Other salts of ammonium that are used for much the same purpose are: Ammonii carbonas, four grains; liquor ammonii acetatis, drams two.

For the physiological action of ammonia on the circulation see the discussion of the cardiac stimulants.

CUBEBA.

Fluid extract, minims fifteen.
 Oleoresin of cubeb, grains five.

COPAIBA.

Oleoresin, minims ten.

BALSAMUM PERUVIANUM.

(Balsam of peru), grains ten.

BALSAMUM TOLUTANUM.

(Balsam of tolu), grains ten.
 Tincture tolutana, 20 per cent.
 Syrupus tolutanus, drams four.

BENZOIN.

Tincture benzoini comp., containing benzoin, aloes, styrax, balsam of tolu, and alcohol; minims thirty.

This preparation is sometimes used internally, but more commonly a teaspoonful is added to a pint of steaming water, and the medicated steam is inhaled. The effect in chronic cases is often heightened by the addition of oil of eucalyptus and menthol. Thus:

R Alei Eucalypti, ʒss .
 Menthol, gr. xxiv.
 Tr. Benz. Comp., q. s. ʒʒi .
M. et Sig:—Use for inhalation as directed.

CREOSOTUM.

Creosotum, minims two.

Guaiacol, minims two.

Guaiacolis carbonas, grains five.

These preparations are obtained from wood tar. Creosote contains guaiacol. They may be prescribed in capsule, but are preferably given in emulsion. Thus:

R Cresoti, m. xlviii.
Ol. Carophyl., m. ii.
Acaciæ, q. s. fʒiij.
Aq., q. s. fʒiij.

M. Sig:—A teaspoonful in water after food.

Creosote has been used very largely in the treatment of tuberculosis, but it should always be stopped if it disturbs the digestion. In certain cases it seems of value in increasing doses, particularly where there is much purulent expectoration and considerable fever. One ounce of creosote may be prescribed, and the patient directed to place five drops in a half glass of very hot water and stir it for fifteen minutes, increasing a drop at a dose. In using the drug in this way it is important to watch the urine, as creosote is likely to produce irritation of the kidney.

Creosotal is an oily liquid containing 92 per cent. of creosote, but is said to be much better borne by the stomach. It may be prescribed in exactly the same way as creosote.

PIX LIQUIDA.

Pine tar, minims five.

Syrup picis liquidæ, one fluid dram.

Contains a small amount of creosote. Used as an expectorant and also externally in parasitic disease of the skin. May be applied in the form of unguentum picis liquidæ, 50 per cent.

Ol. eucalyptus, minims five.

Ol. terebinthinæ rectificatum (oil of turpentine).

Terebenum (from the oil of turpentine), minims eight.

Terpini hydras, grains two

Generally prescribed in alcoholic solution and often useful combined with a true cough sedative when, as in chronic bronchitis, the cough is in excess of the expectoration. We may write thus:

R Terpini Hydras, gr. xlviii.
 Codeinæ, gr. vi.
 Glycerini, f3i.
 Alcohol, q. s. ad. solv.
 Elixir Adjuvans, q. s. f3iij.

M. et Sig:—A teaspoonful in water 3 times a day after food.

Enough alcohol is added by the druggist to dissolve the terpine hydras.

Oleum santali, prescribed in capsules or emulsion; dose, eight minims.

JUNIPERUS.

Oleum juniperum, one or two drops; fluid extract, thirty minims, N. F.

OXYGEN.

As W. E. Dixon says: When oxygen is inhaled by a normal person it produces no effect whatever; there is no increase in oxidation or in the respiratory exchange. Oxyhæmoglobin is a definite chemical substance which during normal respiration is practically saturated with oxygen. Analysis of normal blood shows 18.5 per cent. by volume of oxygen as oxyhæmoglobin, and 0.6 per cent. of oxygen in solution in the plasma, though the substitution of oxygen for ordinary air does not affect the oxyhæmoglobin, but does increase the amount of oxygen in the plasma up to 3 per cent. During normal oxidation of the tissues the oxygen in solution in the plasma is first used, combined oxygen being utilized only to the extent of 30 per cent.

The inhalation of oxygen is, therefore, of distinct value when for any reason there is failure of sufficient supply of oxygen to the blood. It is indicated after severe hemorrhage in cardiac and respiratory diseases where there is marked dyspnœa. It is used by many surgeons immediately after anæsthesia, and is believed by them to lessen the tendency to shock and post-anæsthetic vomiting. Just before the crisis of pneumonia it is often very helpful, and may sometimes save life. It is, of course, only a temporary measure. The oxygen is usually given from a tank into a rubber bag, then passed through a wash-bottle. The tube may be placed in one nostril, the mouth being kept closed and the finger held on the other nostril, which is closed with each inspiration and released each time the patient expires. This may be continued for a few minutes, and repeated at short intervals.

CHAPTER XXI.

DRUGS USED TO REDUCE TEMPERATURE.

By lowering blood pressure, the tincture of aconite, minims ten; the nitrites, particularly *spiritus ætheris nitrosi*, minims thirty.

By increasing the amount of sweat, Dover's powder, *pulvis opii et ipecacuanhæ*, grains ten; pilocarpin, grain one-tenth; fluid extract of *pilocarpus*, minims thirty.

By depressing the thermogenic centre, **antipyrine**, five grains; **acetphenetidine**, five grains; and **acetanilidum**, five grains.

The first two classes have already been discussed, save pilocarpine, which will be described under drugs intended to produce sweating. It is with the third class that we have here particularly to deal. They are all locally irritant anæsthetics. They are all depressant to the circulation. They are all likely to produce a papular eruption, and they all tend to destroy the hæmoglobin of the blood with the production of methæmoglobin, giving to the blood a chocolate color. They all reduce body temperature when it is abnormally high by depressing the thermogenic centre, thus reducing the production of heat. They are all coal tar derivatives. They all tend to produce sweating. Antipyrine is not oxidized in the body, and is eliminated unchanged or combined with sulphuric acid.

The other two members of the group, acetphenetidum and acetanilidum, are oxidized. They are eliminated as para-amidophenol combined with glycuronic or sulphuric acid, will reduce Fehling's solution, and at times impart to the urine a smoky color.

Differences in Action.

Antipyrine is the only one that is soluble in water. It should rarely be given in combination with other substances. It is more likely than the others to produce a rash. Acetphenetidum is the safest, acetanilid is the most dangerous of them all.

They are all distinctly depressant, and have a decided tendency to relieve pain.

Toxicology.

When given in toxic doses to a febrile patient they produce symptoms of collapse associated with cyanosis; the pupil is dilated; the respirations become rapid and shallow; the body temperature falls; the skin feels cold and moist; the reflexes are diminished; the pulse is rapid and weak. If given for long periods of time in small doses there is often a feeling of chilliness; a bluish discoloration of the skin; the blood becomes dark in color; there is marked weakness, and commonly a papular eruption which sometimes becomes pustular. Sometimes there is disturbance of the gastro-intestinal tract, with nausea and vomiting. Some people show marked idiosyncrasy to these drugs, and in them small doses produce alarming effects. The condition of shock is in all probability mainly due to the sudden lowering of the body temperature. The treatment of the poisoning is to empty the stomach, as before described, and stimulate the circulation freely.

Therapeutic Application.

Antipyrine is sometimes used, twenty or thirty grains to the ounce, as a local anæsthetic. It first produces marked irritation. Acetphenetidum is occasionally used as an antiseptic dusting powder.

To Lower Body Temperature.—These drugs should be avoided in the long-continued fevers, because fever is probably a protective measure on the part of nature against infection, and, in some diseases, as typhoid fever, the drug should be used with great caution. When, however, there is marked restlessness, small doses of one or two grains of these antipyretics may be used with advantage.

To Relieve Pain.—The antipyretics are particularly valuable, but they do not reach the cause, merely the symptom. In the treatment of influenza, which is often associated with severe pains in the muscles and back, these drugs are useful. In the relief of headache they are efficacious, but if the headache is of chronic type they should not be continued indefinitely because of injurious effects. They form one of the constituents of almost all of the proprietary headache powders. For the relief of pain in acute

articular rheumatism, they may be combined with the salicylates. Thus:

R Acetphenetidini, gr. xxiv.
Ammon. Salicyl., ʒi.

Ft. in cap. No. 24.

Sig:—Two 3 times a day after food.

Or, for the relief of headache, they are often well combined with camphor and caffeine. Thus:

R Acetphenetidini, gr. xxiv.
Caffein, gr. xii.
Camphor Monobromate, gr. xxiv.

Ft. in cap. No. 12.

Sig:—One every 2 hours for 3 doses.

The dose of any of these substances may be put down as from one to five grains. Preference is usually given to acetphenetidine, unless we desire to give the drug in solution, when antipyrine must be used.

CHAPTER XXII.

DRUGS USED TO PRODUCE SWEATING.

PILOCARPUS.

Fluid extract, minims thirty.

Pilocarpine, active principle, 1/16 of a grain.

Physiological Action.

Local Action.—Irritant.

Pupil.—Contracts it peripherally.

Circulation.—In fairly large doses, pilocarpine slows the heart rate by stimulating the peripheral end of the vagus nerves; in small doses, however, the heart rate is usually quickened. It tends to constrict the great central vessels, but there is usually dilation of the peripheral skin vessels.

Action Upon Secretion.—It tends to increase all secretions, probably by direct action upon the glandular structures. The milk and bile, however, are probably little affected. This increase of secretion is most likely brought about by stimulating the peripheral nerves. If the patient is kept cold the urine is generally increased.

Action Upon the Blood.—The number of leucocytes in the blood is increased by the drug. The effect upon the nervous system is unimportant.

Toxicology.

There is usually a reddening of the skin, with marked salivation, free sweating, the pulse rate becoming rapid and later slow; there is often nausea and vomiting and sometimes diarrhœa; the peripheral blood vessels are dilated; marked œdema of the lungs may develop, and extreme muscle weakness; death usually results from respiratory failure.

Treatment of Pilocarpus Poisoning.

Tannic acid is the antidote. Circulatory stimulation, as before described, and the use particularly of atropine, which is to some extent a physiological antidote.

Therapeutic Uses.

To Produce Sweating.—Here it may be given by the mouth or hypodermically in one-twentieth of a grain dose and repeated, usually accompanied by a hot pack. In serious conditions, such as uræmia, it should be used most cautiously, particularly if the circulation is weak, as it is likely to produce œdema of the lungs, as above stated. A 2 per cent. solution (ten grains to the ounce) is sometimes used by ophthalmologists to contract the pupil.

In tinnitus aurium and other diseases of the ear affecting the labyrinth it is said to be of value. It has been used as a local application to increase the growth of hair. It is here of very doubtful value.

All the *drugs that produce nausea*, such as apomorphine (grains one-tenth), produce sweating as well; pulvis ipecacuanhæ, dose five grains; syrup of ipecacuanhæ, minims fifteen; pulvis ipecac et opii, dose ten grains; antimony, in the form of antimonii et potassii tartras, one-tenth to one-half of a grain.

Drugs that tend to dilate the blood vessels.

Spiritus frumenti, fluid ounce one.

Spiritus glycerylis nitratis, minims two.

Sodii nitris, grain one.

The following are the indications for increasing the perspiration:

To get rid of toxines, as in uræmia, or in lead or tobacco poisonings, or in rheumatism or gout. To get rid of dropsical effusions. To abort diseases, as coryza or bronchitis.

To reduce the body weight free sweating is best, accomplished by the hot pack or the hot air bath. Probably the safest drug is whiskey, administered in hot water.

The method of prescribing Dover's powder has been given in detail under opium.

CHAPTER XXIII.

DRUGS USED AS SPECIFICS.

THYROID GLAND.

Active principle is iodothylin, containing about 9.3 per cent. of iodine.

Physiological Action.

A dog deprived of the thyroid gland shows increased reflexes, and often convulsions and death in a few days. In congenital absence of the thyroid gland in man—so-called cretinism—we have a myxœdema, which resembles dropsy save that it does not pit on pressure; the tongue, hands, and feet are abnormally large, the intellect is sluggish, and the growth is usually stunted. The feeding of thyroid to these individuals greatly improves their condition as long as the drug is continued. The surgical removal of the thyroid gland, particularly if the parathyroids also are removed, at times produces a peculiar condition of tetany, which may later be followed by myxœdema. When thyroid extract is given to a normal individual it sometimes causes a very rapid pulse, tremors, a rise in body temperature, gastro-intestinal disturbance, and extreme nervousness—a condition which somewhat resembles Graves' disease or exophthalmic goitre. Sometimes where there is merely enlargement of the thyroid gland without the symptoms of exophthalmic goitre, the giving of the thyroid extract or of the iodides diminishes the size of the thyroid, indicating that the gland has hypertrophied, because there is excessive demand on the part of the tissues for thyroid extract and when it is artificially applied the gland tends to atrophy. On the other hand, if the thyroid extract or the iodides be administered to individuals suffering from hyper-thyroidism, as in Graves' disease, they are usually made worse by the drug. The thyroid extract has a profound influence on metabolism, increasing the oxidation of proteid material and fats, therefore producing decided loss of weight. As a rule, it markedly accelerates the pulse rate, but has no other important effect on the circulation.

Preparations of the Thyroid.—*Glandulæ thyroideæ siccæ*; dose, five grains in capsule.

Therapeutic Uses.

Specific in myxœdema, cretinism (congenital absence of the thyroid); of some value in the treatment of obesity, but soon loses its effects.

Chronic psoriasis is said to be greatly benefited by the drug. When symptoms are produced after surgical removal of the thyroid gland, it is often of benefit.

Preparations of the parathyroids are being used, but this is at present experimental.

QUININE.

An important alkaloid of cinchona.

Physiological Action.

Local Effect.—Irritant.

An **antiseptic**, particularly destructive to the plasmodium of malaria. It tends to lessen the amoeboid movements of the white blood cells; is a slight stimulant to the circulation; lessens oxidation throughout the body; has a slight tendency to lower body temperature, probably by retarding heat production. Quinine, because of its extremely bitter taste, tends to stimulate digestion.

Elimination.—Largely by the kidneys.

Special Senses.—Causes an impairment of hearing, associated with tinnitus, probably of central origin.

Central Nervous System.—In tremendous doses depresses the circulation in the brain and cord; is of no importance in human medicine; is said to be sometimes the cause of the appearance of blood in the urine during the treatment of malaria, the so-called black-water fever. Much of the physiological action of quinine is rather doubtful.

Action on the Uterus.—Tends to increase the rhythmic contractions of the uterus by stimulating the muscle wall itself.

Symptoms of Cinchonism.—Ringing in the ears; headache;

dilatation of the pupil; some interference with vision, followed later by deafness and incoördination of gait.

Contra-indications.—Idiosyncrasy.—Some persons cannot take quinine at all without the production of a violent urticarial skin eruption and symptoms of great depression, sometimes with delirium.

In inflammation of the stomach it is likely to induce vomiting. Contra-indicated in diseases of the middle ear, and in inflammatory diseases of the genito-urinary tract.

Therapeutic Application.

Preparation.—Quinine sulphate; dose, five to ten grains; soluble in 720 parts of water.

Quinine hydrochloride; soluble in eighteen parts of water.

Quinine bisulphate; soluble in 8.5 parts of water.

Quinine and urea hydrochloride (freely soluble); for hypodermic use.

The sulphate may be converted into bisulphate by the addition of a few drops of sulphuric acid.

Hypodermically the drug is extremely irritant, and likely to produce abscess, and should only be used in this way in great emergency. In the treatment of malaria quinine is a specific, curing by killing the plasmodium. It is somewhat rapidly absorbed and about one-half as rapidly eliminated, and the dosage should be so arranged that the largest amount of quinine will be in the blood at the time of the chill when the sporules are free in the circulation. In a simple case of acute tertian malaria, if there is time, the gastro-intestinal tract should be cleared by the use of five grains of calomel.

R Quininae Bisulphatis, 3℥.

Ft. in cap. No. 12.

Sig:—One every hour for 4 doses.

The last dose should be given two hours before the expected chill.

In the *æstivo-autumnal* type of the disease the temperature is much more irregular, and usually larger doses of quinine are required. It can be pushed until the condition is controlled or

until symptoms of cinchonism are produced. In malignant malaria the dose is usually still larger, forty or fifty grains being given, and, if the patient is unconscious, either by rectum or hypodermically.

In **chronic malaria** it is said that the paroxysms are likely to occur every seventh day. On this day twenty or thirty grains of quinine may be given, and during the interim arsenic is useful in the form of Fowler's solution. As:

R **Liquor Potassi Arsenitis**, fʒss.

Sig:—Two minims after each meal.

Quinine is of some value in the treatment of **coryza**, five grains being given in capsule on retiring.

It is also used as a stomachic to stimulate the appetite, commonly in the form of the crude drug, such as the tincture of cinchona, one fluid dram. Cinchona has been recommended as a remedy for chorea, given in capsules or in solution in increasing doses until the condition is controlled. It is said to act by stimulating the inhibitory centres of the spinal cord.

It is very difficult to administer quinine to children, as they object to the bitter taste. Euquinine (non-official) is said to be tasteless, and only slightly soluble in water.

Elixir eriodictyi aromaticum (N. F.), one fluid dram, is very useful to disguise the taste of the drug in liquid preparations. Thus:

R **Quinine Bisulphatis**, ʒi.

Elixir Eriodictyi Aromatic (N. F.), fʒiil.

Sig:—One teaspoonful every 2 hours.

Quinine bisulphatis, in from 1 to 10 per cent. solution, has been highly recommended of late as an injection in acute gonorrheal urethritis.

Other Drugs Used in the Treatment of Malaria.

Oil of eucalypti, five minims, in capsule or emulsion, is a very old remedy, but not of great value in this disease.

Methylene blue (methylthioninæ hydrochloridum), dose five grains in capsule, is fairly effective, but no better than quinine, and has the disadvantage of staining the urine and fæces blue. It may be used, however, where contra-indications to quinine exist. In

the treatment of chronic malaria arsenic is by far the best remedy and is aided by iron. Thus:

R Arseni Trioxidi, gr. i.
Ferri Reduct, \mathfrak{ss} .
M. Ft. in cap. No. 24.
Sig:—One after each meal.

MERCURY.

All the salts of mercury are probably absorbed as albuminates. Insoluble salts, such as calomel, are much less corrosive than the soluble preparations, such as bichloride. The soluble preparations of mercury are also powerful antiseptics. The bichloride is used in a strength of from one ten-thousandth to one one-thousandth.

Our knowledge of the effect of mercury upon nutrition is very indefinite, but when given for a long period of time it seems to act as a general tonic to the nervous system, as do phosphorus and arsenic.

It is excreted mainly by the bowel. Mercury, particularly calomel, as has been elsewhere stated, is supposed to have a marked influence clinically in increasing the amount of bile. There is, however, no experimental evidence to prove this. It is probable that the greenish stools that follow the use of calomel are due to its antiseptic action, which prevents the bacterial decomposition of the bile.

Toxicology.

Acute mercurial poisoning is generally produced by bichloride of mercury. The symptoms are those of extreme gastro-intestinal irritation, such as burning pain in the epigastrium, vomiting, purging of small bloody stools, with marked tenesmus, and sometimes suppression of the urine. Death usually occurs from exhaustion or a late nephritis. As a rule, the mercury absorbed is not sufficient to give the symptoms of salivation.

The treatment of the poisoning is to administer egg albumen in large quantities, to wash out the stomach; to use morphine to control the vomiting, purgation, and pain, and to stimulate.

Salivation or Ptyalism.—This is produced when mercury is absorbed. The drug seems to have a selective action on the salivary glands, causing foetor of the breath, great increase in the

saliva, tenderness and loosening of the teeth, marked stomatitis; falling out of the teeth, and necrosis of the jaw. It is sometimes produced by very small doses of calomel, particularly when the drug does not purge, and should be carefully watched for when the drug is being administered for any purpose.

The treatment of this condition is to stop the drug; to purge freely with magnesium sulphate; and to use a wash such as

R Potassi Chlorat., ʒi.
Phenol, gr. xv.
Aq. Cinnamomi, fʒiij.

M. Sig:—Dilute one-half with water and use as a mouth wash.

Afterward administer atropine sulphate one one-hundredth of a grain internally.

True chronic mercurial poisoning is seen in those who are exposed to the fumes of the drug, such as barometer and thermometer makers. These patients suffer from cachexia, also from paralysis, usually of upper limbs first, but later the entire body may be affected. There is marked tremor and extreme nervousness.

The treatment is mainly a change of occupation.

Important Preparations.—Hydrargyri chloridum mite (calomel), grains five to ten, or, more commonly, one-tenth of a grain repeated every half hour until ten doses are taken; followed by a saline.

Hydrargyri chloridum corrosivum, grain one-twentieth; most commonly used externally as an antiseptic in a solution of 1 to 4000.

Hydrargyri flavum iodidum (protiodide), grain one-quarter.

Hydrargyri iodidum rubrum (biniodide), grain one-twentieth.

Hydrargyri oxidum flavum. The yellow oxide is used almost exclusively, applied externally in from $\frac{1}{2}$ to 10 per cent. ointment.

Unguentum hydrargyri ammoniatum, 10 per cent., should be diluted at least $\frac{1}{2}$. Useful in parasitic conditions of the skin.

Massa hydrargyri (blue mass); used as a cathartic in acute constipation; grains four.

Unguentum hydrargyri, 50 per cent. mercury.

Unguentum hydrargyri dilutum (blue ointment), 33 per cent. of mercury.

Therapeutic Uses.

Locally calomel is often used as a dusting powder for a mild antiseptic application, such as:

℞ Hydrargyri Chlor. Mit.
Bismuth Subnitrat^{is}, aa ʒi.
Talc. Purificat., q. s. ʒi.

Furthermore, it is used for the destruction of parasites, particularly pediculi, applied locally in the form of blue ointment.

As a Purgative.—Calomel or blue mass is given; these have already been discussed.

In the Treatment of Syphilis.—First by the mouth. Here the hydrargyri iodidum flavum is commonly used in pill, one-quarter of a grain, increasing a pill a day until tenderness of the teeth is produced, when the drug should be stopped for three or four days and then continued in half the dose which caused the tenderness.

Hypodermically.—One-sixteenth of a grain of bichloride of mercury in solution may be injected hypodermically once a day when for any reason it cannot be given by the stomach or a very rapid action is desired. It is painful, and may be preceded by one-quarter of a grain of cocaine, the mercury following the cocaine without removing the needle. Mercury succinimide, $\frac{1}{5}$ of a grain, can also be used hypodermically. It is likely to produce local irritation. It has been highly recommended in the treatment of pulmonary tuberculosis, but many of the results are disappointing. If syphilis co-exist, it is worthy of trial. The treatment is rather painful.

Through the Skin.—Here we might use a dram of blue ointment, commonly written for thus:

℞ Ung. Hydrargyri Dilut., ʒiil.
Ft. in chart. No. 16.
Sig:—Use externally as directed.

In inherited syphilis in children this may be rubbed well into the abdomen; in adults, into the groins and axilla alternately.

Mercury is more useful in the treatment of syphilis than the iodides, and is valuable in all stages of the disease.

THE IODIDES.

Physiological Action.

Locally.—Irritant.

Preparations.—Tincture iodi contains iodine, seven parts, and potassium iodi, five; used externally almost exclusively as a counter-irritant for the relief of pain; may be diluted one-half with alcohol. It is also a powerful antiseptic.

Liquor iodidi compositus (Lugol's solution) contains iodine and potassium iodide in water; dose, three minims.

Unguentum, 4 per cent.

These preparations all tend to increase the amount of iodo-thyrin in the thyroid gland. In tumors of the thyroid, where this substance is deficient, the iodides are beneficial. If there is a true hypertrophy of the thyroid then the drug rapidly produces irritation, quick pulse, palpitation, tremors, nervousness, sleeplessness, headache, and sometimes atrophy of the sexual organs. The iodides never produce these symptoms in the normal individual.

It has been believed by many that the iodides in therapeutic dose tend to lower blood pressure. They act as specifics in the treatment of tertiary syphilis, and also seem to have the property of causing absorption of fibrous tissue.

Elimination.—As iodine in the urine, saliva, perspiration, milk, and nasal secretion.

Iodism.—Fœtor of the breath, sometimes a slightly coated tongue, and some salivation, but, most characteristic of all, the symptoms of coryza, with frontal headache and a papular eruption. These symptoms generally subside when the drug is discontinued.

Therapeutic Application.

The iodides are locally irritant to the stomach, and should, therefore, be administered after food. The following salts may be used:

Potassium iodide.

Sodium iodide.

Ammonium iodide.

Strontii iodide.

Each may be given in from five to ten grain doses, beginning with small doses and increasing, as some persons can take only very little without the production of iodism.

Sodium iodide is least irritant to the stomach. We may write thus:

R Sodii Iodid, ℥i.
Aq., q. s., f℥i.

M. et Sig:—Five drops, increasing as directed, three times a day after meals, in water.

For external use and absorption through the skin, unguentum potassii iodide, 10 per cent. strength, in benzoinated lard.

If in the treatment of late syphilis we wish to use a combination of the mercury and iodides, the so-called mixed treatment, it is important to remember that whatever preparation of mercury is prescribed the biniodide of mercury is formed, which is very poisonous; therefore, it is well to write for the biniodide in its proper dose. Thus:

R Hydrargyri Iodidi Rubr., gr. i.
Potas. Iodid., ℥ii.
Syrup. Sarsaparillæ Comp., q. s. f℥iii.

M. Sig:—A teaspoonful after meals 3 times a day.

In the treatment of aneurism and in arteriosclerosis the iodides are believed to be of value. It is probable that they are helpful when these conditions are manifestations of syphilis.

In the Treatment of Asthma.—As the iodides tend to increase the secretions from the bronchi they are useful in asthma associated with dryness of the mucous membrane.

In the Treatment of Scrofula in Children.—In latent tuberculosis, with slight anæmia and enlargement of the glands of the neck, as commonly seen in children, the iodides seem to be of value; the glands may be reduced in size or the iodides may precipitate suppuration of the gland and then its rapid disappearance.

In Pulmonary Tuberculosis.—There is much dispute about the use of iodine and the iodides. Some clinical authorities recommend it highly, given usually by inunction, and believe that there is a distinction between the action of iodine and the iodides in this condition. On the other hand, it is well known that the iodides tend to promote the breaking down of tuberculous tissue, and the administration of the iodides to tuberculosis patients may cause the reappearance of tubercle bacilli in the sputum.

When the drug is administered to scrofulous individuals we may use the *syrupus acidi hydriodici*, one fluid dram; *syrupus ferri iodidi*, dose fifteen minims. The iron in this preparation is so small in amount as to be of little value.

Iodine and the iodides are used for local application in atrophic conditions of the nose and throat. It is to be remembered that iodine is more soluble in water or glycerine when combined with iodides. For local application to the mucous membranes we might write:

℞ Iodl., gr. viiss.
Potas. Iodid., gr. xv.
Glycerine, fʒi.

IODOFORM.

Locally.—Slightly irritant, anæsthetic, and antiseptic, a desiccant and protective. If used too freely on abraded surfaces the drug may produce nausea, headache, delirium, insomnia, and sometimes convulsions. In the treatment sodium bicarbonate has been prescribed and free elimination. If any preparation of iodine has been taken in excess by the mouth starch is the antidote.

Therapeutic Application.

A great objection to the use of iodoform is its very unpleasant odor.

In the treatment of joint and bone disease a 10 per cent. emulsion of iodoform and olive oil may be used. Internally, in from one to five grains, it may be of value in the treatment of pulmonary phthisis.

In the treatment of hemorrhoids it is one of our most efficient remedies, being used in an ointment as *unguentum iodoformi* or in suppository. Thus:

℞ Iodoform, ʒi.
Ol. Theobrom., q. s.
Ft. in sup. No. 12.
Sig:—One at night.

In the treatment of tuberculosis and other types of chronic laryngitis, two grains of iodoform to the ounce of olive oil may be used, to which may be added twenty or thirty drops of the spirits of turpentine.

Iodolum is used for exactly the same purpose as iodoform; it is not as effective, but lacks the unpleasant odor of the latter.

PHOSPHORUS.

Locally.—Powerfully irritant, producing in those who work in phosphorus fumes marked conjunctivitis and coryza, and sometimes necrosis of the jaw. It is absorbed largely from the small intestine, and circulates as phosphorus. Phosphorus tends to increase metabolic breakdown throughout the body, and particularly to increase carbohydrate metabolism. It also tends to produce fatty changes in the body, particularly seen in phosphorus poisoning.

On the Bones.—Under the influence of phosphorus the bones become denser and harder, particularly in the young.

Excretion.—Phosphorus is oxidized in the body, and is excreted mainly as phosphates.

Poisoning.—Pain, nausea, vomiting. Vomitus is often phosphorescent. Pulse becomes rapid and weak; there are general symptoms of collapse; soon the acute symptoms subside, save that the pulse generally remains weak. After two to five days there is a recurrence of the symptoms; the patient becomes jaundiced; there is a peculiar odor of garlic to the breath; there is usually headache; the liver at first becomes large and tender, later small; urine is dark in color, contains albumen, bile, and sometimes leucin and tyrosin; pulse and respiration remain feeble, and delirium may supervene. Death may be due to cardiac failure; post-mortem examination shows marked fatty changes throughout the body.

Treatment.—The antidotes are copper sulphate, grains five, causing an insoluble copper phosphide. Potassium permanganate, 1 to 500 solution, converts the phosphorus into phosphoric acid; the stomach may be washed out with this solution.

Mucilaginous drinks, such as acacia, and egg albumen, may be used; free stimulation of the respiration and circulation; morphine to control pain and delirium. Avoid the use of oils, as they assist absorption.

Preparations.—Phosphorus, grain one one-hundredth.

Pilulæ phosphori, in each one one-hundredth of a grain.

Therapeutic Uses.

In the treatment of all conditions of bone where an increase in the mineral salts is required, as in rickets, general states of malnutrition, and osteomalacia.

As a stimulant to the nervous system and general tonic, phosphorus has long been used on the ground that it is an important constituent of the nervous system; but, as stated under the physiological action, in large doses phosphorus tends to produce fatty degeneration and also to increase tissue waste. Its use as a general tonic is, therefore, more or less empirical, but there seems to be some clinical evidence of its value. It is said also to be useful internally in the treatment of boils and chronic diseases of the skin, such as acne.

PHOSPHORIC ACID.

Acidum phosphoricum dilutum, twenty minims. Largely used as a general nervous stimulant or tonic; of very doubtful value.

HYPOPHOSPHITES.

There is no experimental evidence that these salts have any direct action in stimulating the nervous system or in influencing nutrition, but they are largely used for this purpose empirically. The preparation commonly contains iron and strychnine, however, both of which are active. The most common preparation is *syrupus hypophosphitum compositus*, fluid drams, two; this contains hypophosphites of calcium, potassium, and sodium, free hypophosphorous acid, iron, manganese, quinine, strychnine, and sodium citrate.

Glycero-phosphates have been used for much the same purpose as the above, most commonly those of sodium and lime in doses of five grains.

OLEUM MORRHUÆ.

(Cod Liver Oil.)

Cod liver oil is obtained from the liver of the codfish; it is obtained by a steam process in which the oil is melted out of the fresh livers; it contains the constituents of ordinary animal fat and is useful, therefore, as a food. Iodine and phosphorus are

contained in traces, and several bases or alkaloids have been found in the crude oil; their true action, however, is uncertain. The oil has a tendency to disturb digestion, often causing loss of appetite, nausea, and diarrhoea. Taken continuously it increases the body weight, as does any fat. Sometimes, however, it seems to be better borne by people of delicate digestion than other forms of fat, particularly when emulsified. The substance should not be classed as a drug, but as a food. The probable reason why it is sometimes better borne by the stomach and more rapidly absorbed is because it forms an emulsion more readily than most other oils; therefore, it is useful in malnutrition as a fat food, provided it does not disturb the digestion. It may be prescribed in 50 per cent. emulsion as *emulsum olei morrhue*, fluid drams two to four; *emulsum olei morrhue cum hypophosphitibus*, two to four drams. If we wish to write an emulsion:

R *Ol. Morrhue*, fʒiss.
Ol. Caryphyl., m. iiii.
Acacie, q. s.
Glycerine, fʒss.
Aqu., q. s. fʒvi.

M. et Sig:—Two teaspoonfuls after meals.

It has been proven of late that the crude oil contains certain animal substances which have a powerful pressor action on the circulation. This may possibly substantiate the contention of many of the older clinicians that the crude oil is a better tonic than the more refined product; but the former is much more nauseating.

THIOSINAMINE.

Derived from oil of mustard; dose, two grains in capsule, or hypodermically, fifteen minims of 15 per cent. alcoholic solution daily. Used to promote absorption of excessive fibrous tissue, as locally for scars. Fibrolysin (solution of Thiosinamine and sodium salicylate) dispensed in tubes each containing 35 minims for hypodermic use. The injections are said to be painless.

COLCHICUM.

Preparations.—*Tr. colchici seminis*, thirty minims. *Vinum colchici seminis*, thirty minims. *Fluid extract colchici seminis*, three minims. *Colchicina*, one one-hundredth of a grain.

Toxicology.

Gastro-enteritis, with rice-watery stools; antidote, tannic acid.

Therapeutic Application.

Valuable in the treatment of acute gout.

DIPHTHERIA ANTITOXIN.

Serum antidiphthericum.—Obtained by injecting into a normal horse one Cc. of the toxin produced by the Klebs-Loeffler bacillus. This is gradually increased until the horse is able to receive several hundred times the fatal dose without any ill effect. The animal is then bled, the serum is separated from the corpuscles, and its strength determined in units. The unit: The amount of antitoxin which will protect a guinea-pig weighing 250 grams against one hundred times the fatal dose of diphtheria toxin. Serums can now be made in such concentrated forms that 1,750 antitoxic units are contained in each Cc. of the serum.

In the treatment of diphtheria, antitoxin should be used if possible within the first twenty-four hours, for the following reasons: First, so that there will not be too much toxin formed to overcome; second, before there is a mixed infection; third, before the toxin has produced any organic changes in the heart or nerves.

Dosage.—4,000 units, to be repeated in twelve hours if necessary. The dose is usually not much reduced for children. To immunize, 500 to 1,000 units may be used, the immunity lasting from three to four weeks.

Unusual Effects.—Antitoxin is sometimes followed by a rash, but this is very rare with the concentrated serums. In rare instances antitoxin has been followed by sudden death from respiratory failure, probably due to the idiosyncrasy of some individuals toward horse serum. This has usually occurred after the use of antitoxin in the treatment of asthma, for which it has lately been empirically employed. These rare fatalities may be due to anaphylaxis, a destruction of the blood by a second dose of a serum of another species. Experimentally, animals always die of respiratory failure. The greatest care should, therefore, be exercised in repeating doses of serum to individuals with respiratory disease.

Methods of Administration.—The usual precautions for

sterilization are taken. It is given hypodermically at the angle of the scapula or above the buttocks, injected extremely slowly, and a collodion pad placed over the puncture. If the antitoxin is obtained from the Board of Health you usually have to supply your own syringe; if from the large manufacturing houses the dose is put up ready for use in a glass syringe.

Other antitoxic serums are: For tetanus (valuable as a prophylactic measure) and for streptococcus. This latter remedy may be tried in erysipelas, and in ulcerative endo-carditis, given in doses of twenty Cc., there being no standard unit. The so-called Flexner anti-meningococcic serum for the treatment of cerebro-spinal meningitis is at present being largely used, and with very gratifying results. It is generally given by lumbar puncture.

TUBERCULIN.

Preparations.—*Tuberculin, T. O.*, was originally the toxin elaborated by the tubercle bacillus in bouillon culture containing 25 to 50 per cent. of glycerine. Before filtering the bacteria are killed by heat.

Tuberculin (Deny's, B. F.) differs practically from old tuberculin only in the fact that no heat is used in its preparation.

Tuberculin, T. R.—This consists of tubercle bacilli ground up and dried in a vacuum. It is supplied in liquid form, two milligrams of the powder to each Cc.

Bacillen Emulsion (B. E.).—A suspension in 50 per cent. glycerine of ground-up tubercle bacilli, each Cc. containing five milligrams of powder.

Tuberculin is also used for diagnostic purposes.

The Older Hypodermic Method.—Note the temperature every two hours for three days. Inject 0.2 of a milligramme of tuberculin; if no temperature is produced after two days, inject one milligram. Sometimes the third dose of five milligrams is given. Two positive reactions are required to make a diagnosis certain. This method is beginning to be looked upon as being somewhat dangerous, as the reaction depends upon adding to the tuberculin already in the body enough more to produce a reaction. There are three other methods now in use for diagnosis with tuberculin.

The Calmette Ophthalmo-reaction.—One drop of a 1 per cent. solution of purified tuberculin is instilled into the normal eye. If tuberculosis be present in the individual an intense inflammation with sero-fibrinous exudate appears, beginning in about three hours, and reaching its maximum in about six. This method must not be used twice in the same eye if the first test fails, as, when the eye is sensitized to tuberculin, it will react even though the patient is not tuberculous. The test is not free from danger, as several seriously inflamed eyes have been reported from its use. The reliability of the reaction in tuberculosis is fairly well established in children.

The von Pirquet Vaccination Reaction.—This consists of the use of small capillary tubes put up in exactly the same way as is the glycerinated lymph for vaccination against smallpox. The usual antiseptic precautions are taken, then the lymph is dropped on the arm in two places, three or four inches apart, and a stab is made with a small scalpel through the tuberculin. The tuberculin is then rubbed well into the incision, and between these two points of vaccination a third stab is made, without any tuberculin, to be used as a control. A positive reaction, occurring in from six to twelve hours, shows a brilliant red aureole around the vaccinated points, the control remaining unaffected. This method is still on trial, but is believed by many to be very reliable.

The tuberculin ointment, containing tuberculin, is simply well rubbed into the arm over an area of about the size of a dollar, the rubbing being continued for one and a half minutes. A positive reaction is indicated by an erythematous and sometimes papular eruption, which appears in from six to twelve hours, sometimes earlier.

Therapeutic Uses.

Trudeau begins with a dose of one two-thousandths m. g. of the bacillen emulsion, or one one-thousandth m. g. of old tuberculin, and increases very slowly, being careful to avoid a reaction, six months or a year being required for treatment. The purpose is to produce a tuberculin immunity so that the final dose shall be over one milligram. The cases that are apparently benefited by this treatment are the incipient ones, with no mixed infection and little fever. The value of the treatment is still doubtful.

Sir A. E. Wright, in tuberculosis as well as other infections, injects an emulsion of dead bacilli into the individual and gauges the dosage by taking the opsonic index, of which the following is a brief outline:

The opsonins are substances contained in the blood serum which act upon the bacilli, preparing them to be ingested by the leucocytes. The meaning of the word opsonize is **to prepare the food for**. Take a small test tube containing ten Cc. of a 1 per cent. citric acid solution in normal salt solution; let ten drops of blood from your own finger fall into the solution. The citric acid will prevent coagulation of the blood. The solution being thoroughly mixed is now centrifuged at a high rate of speed, the red blood cells going to the bottom and the white rising; the citric acid solution is now drawn off almost to the level of the white blood corpuscles. Take two small capillary tubes, open at both ends and having a slight enlargement in the middle, prick your own finger, and by capillary attraction draw up two or three Cc. of blood. Repeat the procedure with a patient; seal in the flame both ends of these tubes. One end is usually bent so that it can be easily hung in an ordinary centrifuge tube. The blood thus obtained is centrifuged at a very high rate of speed, the clot being thus forced to the bottom, the serum remaining on top. Take the emulsion of dead bacilli in a small tube; take two long capillary tubes, plug with cotton at one end and on the same end put a small rubber bulb; let the capillary tubes be divided into three approximately equal parts; draw up into one tube to the first mark, first, some leucocytes from the tube containing the citric acid; second, the bacterial emulsion to the second mark; third, your own serum from the centrifuge blood tube, having broken off the end. Repeat exactly the same process with the other capillary tube, save that you take the patient's serum instead of your own. You now have in each tube leucocytes, bacilli, and serum, which, we must remember, contains the opsonins. The serum in one case, however, is that of the patient, and in the other is a normal serum. Thoroughly mix the three different substances in each tube. This may be accomplished by very carefully pressing and relaxing the bulbs. Put the tubes into an incubator at 37° F. for thirty minutes. Put a drop of each on separate slides; spread; stain by Wright's method, and examine with the oil immersion lens. Count the

number of bacteria in 100 leucocytes in each slide, divide the total number by the number of leucocytes counted, which will give the average number of bacteria in each leucocyte. Suppose that the slide in which your own serum was used averaged ten bacteria to a leucocyte; if, therefore, the slide containing the patient's serum averages five bacteria to the cell his opsonic index will be just one-half of the normal, or 0.5. To obtain an accurate normal opsonic index, three different normal individuals are taken. The opsonic index of each is determined, and the average of the three taken as the normal. The dosage of the bacterial emulsion is given as already described. The immediate result is the production of a fall in the patient's opsonic index, the so-called negative phase. Following this, however, there is a positive phase, which brings the opsonic index above what it was previous to the injection. No other injection is given until the beginning of a second negative phase. The dosage is thus gauged by the opsonic index. The method is extremely complex, and to be of practical value must be done by an expert bacteriologist, particularly drilled in opsonic work.

VACCINE THERAPY.¹

The epoch making work of Wright has excited great interest and wide application of vaccines to various diseases.

Determining the opsonic index has been pretty generally conceded (save in rare instances) to be unnecessary. First, because to get accurate results, special skill and training is required, together with elaborate laboratory equipment; and, second, because even under the best circumstances the method itself has certain intrinsic sources of error.

The clinical reaction of the patient as to pulse, temperature and general condition is at present more commonly taken as the guide to dosage and frequency of administration, and it must frankly be admitted that in the present state of our knowledge we must be guided by clinical experience.

Briefly, the theory on which the value of vaccine therapy, in localized disease is based, is as follows:

¹In the preparation of this chapter free use has been made of several chapters in Hare: "Modern Treatment," and "The Scientific Basis for Vaccine Therapy" by Richard M. Pearce, Jour. A. M. A., Dec. 18, 1918.

When a lesion, say a carbuncle caused by the staphylococcus, is producing marked pain with little general reaction, the blood flowing to the lesion has a low opsonic power, the leucocytes and fibrin have formed a protective wall around the focus of infection, and while thus tending to keep it localized are at the same time keeping the opsonins formed in the body from free access to the lesion. If a culture be made from the carbuncle on an agar-agar slant and when the culture is well grown, after incubation, the bacteria be washed from the surface of the agar with sterile normal salt solution and then counted, each dose being put into a separate container, then killed by heating continuously in a water bath at 60° C., and the dose of this bacterial vaccine thus formed be injected into the patient, the toxic substances in the dead bacteria will stimulate the body to the production of more opsonins. These will be carried through the circulation to the lesion and thus phagocytosis will be increased and the lesion more rapidly cured. The immediate results of an infection, however, is a temporary lowering of resistance (negative phase) indicated by the reaction as already stated. This is followed by a positive phase which brings the opsonic power of the blood above what it was originally, thus producing improvement or cure. If the dose has been overwhelming the drop in resistance during the negative phase may be so great that in the positive phase the resistance will not rise as high as before the injection. Then the patient is worse off than before. We may conclude, then, that when an infection is of a subacute or chronic type and localized with little general reactive symptoms and the definite organism or organisms causing that infection can be cultivated, that the injection of known numbers of dead bacteria will often improve the patient and sometimes cure him. To get the best results it is important that the peculiar strain of organism that is causing the local disease be injected. Therefore, autogenous vaccine should be given the preference over stock vaccine, in most instances. Laboratory facilities are such now that a physician may take a culture from a lesion, inoculate an agar-agar slant, mail it to the laboratory where a vaccine can be made, counted, and each dose returned in a single glass sealed ampoule. The objections to this method are two. First, time; and, second, expense; but most of the conditions in which vaccines are known to do good are of the subacute or

chronic type and usually a few days makes little difference. It seems hardly fair to inject into a patient the so-called polyvalent stock vaccine, containing several different organisms, without knowing first what is causing trouble in the patient. There are certain conditions, however, as when a spore forming organism is discovered, or when it is almost impossible to isolate the types of organisms, or in the treatment of gonorrhea and tuberculosis, when stock vaccines are permissible.

The use of so-called "phylacogens," which so far as is clear seems to be the filtrate from bouillon cultures of bacteria widely advertised as useful in the treatment of rheumatism, asthma, angina pectoris and the like (diseases whose origin is distinctly obscure) is not justified unless the empirical evidence of their value be overwhelming.

The Use of Vaccines in Acute Diseases.

The writer is well aware that vaccines have been employed in the treatment of peritonitis, puerperal sepsis, pyemia, and septicemia. If the above theory as outlined be correct, the vaccine in general infection, when the body is already overwhelmed by a toxemia and therefore cannot be further stimulated to the production of opsonins, can do nothing but harm. This, at present, is the generally accepted view among those who have had large experience in this particular line of therapy. In actual practice the vaccines have proven themselves valuable in the treatment of infection by the following organism. It is in the localized staphylococcus pyogenes aureus and albus infection such as furunculosis, carbuncle, acne, sycosis, osteomyelitis, abscesses and surgical wound infection that the most definite results from vaccine have been obtained.

Streptococcus infections are more likely to be general and the results from vaccine therapy here are doubtful. In regard to the pneumococcus there is much conflicting evidence.

Gonococcus Infections.

The cultivation of this bacteria is surrounded with difficulties, but wherever the facilities are obtainable an autogenous vaccine should be employed. Its use holds out a hope of improvement. In

chronic joint infections of gonorrheal origin, the dose varies from 5,000,000 to 50,000,000 killed bacteria. The intervals of infection vary from three to seven days.

Bacillus Coli.

Results are still doubtful. The dosage of vaccines, as has already been intimated, is extremely variable. Tileston after consulting various authorities, gives the following for local infections:

Staphylococcus.	100,000,000-1,000,000,000
Streptococcus.	5,000,000- 200,000,000
Pneumococcus.	10,000,000- 200,000,000
Gonococcus.	5,000,000- 500,000,000
Bacillus coli.	10,000,000- 200,000,000

Anti-Typhoid Vaccination.

Russell's vaccine contains 1,000,000,000 dead bacilli to the cubic centimeter; 0.5 is given hypodermically for the first dose, 1 Cc. for the second, and 1 Cc. for the third. The injections are given ten days apart. After each dose there is a reaction decreasing in severity with each injection. The results of this preventive measure against typhoid fever have been very satisfactory and the method is rapidly coming into general use. To sum up then, in vaccine therapy we undoubtedly have a great advance in our knowledge of curative and preventive measures against disease. We must, however, constantly recognize that we are dealing with dangerous toxic substances and special caution must always be observed.

SALICYLATES.

Physiological Action.

Local Action.—Irritant and tending to destroy the gastric and intestinal ferments; also antiseptic.

Nervous System.—Slightly depressant; has a distinct tendency to relieve pain.

Circulation.—Slightly depressant.

Respiration.—No effect of importance.

Body Temperature.—Tends to lower by depressing the heat centre.

Elimination.—As salicyluric acid.

Toxicology.

When the salicylates are being given in full dose, say ten grains every two hours, symptoms appear much like those of quinine, save that in salicylate acid poisoning the urine becomes of an olive green color. To repeat, these symptoms are as follows: Ringing in the ears, dimness of vision, headache, deafness, fall of temperature. If the drug is continued the pulse becomes rapid and weak, and general paralysis may result. Death is usually due to respiratory failure.

Therapeutic Application.

Acidum salicylicum, grains ten, is now seldom used internally, because the salts of salicylic acid are less irritating and just as effective therapeutically. Locally, however, salicylic acid is used for its antiseptic properties. It may be used in the form of ointment. Thus:

℞ Acid Salicylic, gr. x.
Sod. Benz., gr. xxx.
Adip. Benz., q. s. ℥i.

M. Sig:—Apply externally.

For the destruction of callous tissue, such as corns:

℞ Acid. Salicylic., gr. xxx.
Extract Cannabis Indicæ, gr. v.
Collodii, fʒss.

M. Sig:—Apply each night.

The above prescription is a very old one. The use of the cannabis indica is largely empirical. It is best to anoint the skin immediately around the corn with petrolatum, so that the salicylic acid will not act upon it. Salicylic acid and its salts have been used as intestinal antiseptics, and are believed by some to be effective against the round worm (*Ascaris lumbricoides*). In bromidrosis, excessive sweating of the feet or hands, a dusting powder composed of the following is useful:

Acid salicylic, drams 2.
Acid Boric, ounce $\frac{1}{2}$.
Pulvis Amyli, q. s. ounce 1.

In chronic diseases of the skin, such as eczema, weak ointments of salicylic acid, five or ten grains to the ounce, are beneficial. The salicylates should be avoided internally, in diseases of the middle ear, and in kidney disease.

Salicylate of methyl (U. S.), or the much more expensive oil of gaultheria, which contains about 96 per cent. of salicylate of methyl, may be used externally over inflamed rheumatic joints when we wish to get absorption of the drug through the skin as well as its local effect. We may write:

R Methyl Salicyl.
Adipis Benz., aa ℥ss.
M.

The ointment is applied over the joint, which is then covered with gauze, oiled silk, and, finally, a large pad of cotton held in place by a bandage. Internally the true oil of gaultheria is used in from five to ten drop doses.

In the treatment of rheumatism the salts of salicylic acid are most commonly used. The important ones are sodium salicylate, ammonium salicylate, and strontium salicylate. The latter is by far the slowest, but it is least irritant to the stomach. The ammonium salt is slightly stimulating, and sometimes very well borne.

ASPIRIN.

Acetyl-salicylic acid (non-official); very slightly soluble in water. It is probably unaffected in the stomach. Being dissolved by alkaline fluids, it is absorbed through the intestine. It may be given in ten-grain doses in capsule or suspended in an emulsion for the same purpose as the official salts of salicylic acid. We may write:

R Sod. Salicylat.
Ammoni. Salicylat., aa ℥ii.
Aq. Cinnamomi, q. s. ℥℥i.
M. Sig:—One teaspoonful every 2 hours in milk.

When there is great pain and restlessness we might write:

R Pulvis Ipecac. et Opii, gr. ii.
Acetphenetidini, gr. xxiv.
Acetyl-salicylic Acid, ℥i.
M. et Ft. cap. No. 24.
Sig:—Two every 2 hours.

The older treatment of rheumatism is the so-called alkaline treatment, and sometimes the two may be advantageously combined. Thus:

R Potas. Citrat., ℥i.
Syrup. Ac. Citric, f℥i.
Aq. Menth. Pip., q. s. f℥iij.

M. Sig:—A teaspoonful every 4 hours.

This prescription may be alternated with salicylic acid solution.

In the treatment of so-called chronic rheumatism and for the relief of joint and muscular pain, also to some extent in pleurisy, the salicylates are undoubtedly beneficial. Some clinicians go so far as to say that salicylic acid is useful as a specific in the treatment of pleural effusions. In chronic conditions the salicylates are usually given three times a day after food, it being kept in mind that they are all more or less likely to disturb digestion. The salicylates do relieve the symptoms of acute articular rheumatism. But chronic joint conditions can be rationally treated only after finding the source of the infection, and the salicylates can be looked upon merely as a means of symptomatic relief.

CHAPTER XXIV.

DRUGS USED TO PRODUCE MENSTRUATION. (EMMENAGOGUES.)

CONTRA-INDICATIONS TO THEIR USE.

Pregnancy.—Any organic disease of the pelvic viscera. Other causes of amenorrhœa in which these drugs may be of value: Anæmia, pulmonary tuberculosis, and sudden chilling about the time of the menstrual period. Should the condition be due to anæmia or malnutrition it is best managed by iron, fresh air, and increased food. A very old combination, which to some extent relieves constipation, overcomes anæmia, and stimulates the uterus is in some cases of distinct value. It may be written thus:

R. Tinct. Cantharid., f3ii.
Tinct. Ferri Chlorid., f3ii.
Tinct. Aloes, f3i.
Tinct. Gualaci, q. s. f3iiii.

M. et Sig:—One teaspoonful in water after each meal.

Others drugs that have been used for this purpose are: **Apiol** (from parsley), three to five grains, or apiol, fluid extract, five to ten minims in capsule; **Oil of rue** (French), two to five minims; **oil of tansy**, two to five minims. The above oils are all irritant poisons, and it is extremely rare for them to be justifiably employed as emmenagogues. Poisoning by them is sometimes seen, as they have been used by the laity for the production of criminal abortion. The treatment would be to wash out the stomach and use morphine hypodermically. **Potassium permanganate**; dose, one grain; said to be of value as an emmenagogue, but this is rather doubtful. Other important uses of this substance are as an antiseptic irrigating solution in a strength of 1 to 500 for injection in the treatment of snake bites, and as an antidote to the alkaloids.

MANGANESE DIOXIDE.

Dose, one to five grains. Highly recommended by some, but probably of no great value.

ERGOT.

Useful as an emmenagogue when there is marked uterine relaxation.

CHAPTER XXV.

DRUGS USED TO CONTRACT THE UTERUS. (OXYTOCICS.)

ERGOT.

A fungus found on rye. A very complex substance, which rapidly deteriorates with age. Preparations differ greatly in their activity. In its use, therefore, it is well to be sure that one has a fresh preparation and, if possible, one known to be physiologically active.

Physiological Action.

Ergotoxine, a very active substance found in ergot, easily decomposed, thus rendered inert; a decided irritant.

Tyramine, or hydroxyphenylethylamine, is also very active. Ergot contains several other substances, but it is probable that its physiological action is largely due to these two.

For much of our later knowledge of ergot we are indebted to the work of Barger and Dale. The effects of the active principles of ergot are closely allied to those of adrenaline. These effects being the result of stimulation of the peripheral sympathetic structures, the action is not so powerful as that of adrenaline, but more prolonged.

Circulation.—Marked rise in blood pressure, if either of the active substances be injected, due to the peripheral stimulation of vasomotor sympathetic nerve-endings in the blood vessel walls, also to direct stimulation of the heart by tyramine; but there is marked slowing from stimulation of the pneumogastric centrally, caused by the high blood pressure. Adrenaline should not be used after ergot because, experimentally, it sometimes causes a fall in blood pressure if ergot has been previously given.

Toxicology.

Acute poisoning is seldom seen. It produces gastro-intestinal irritation; a rapid, strong pulse, later becoming weak, and, in

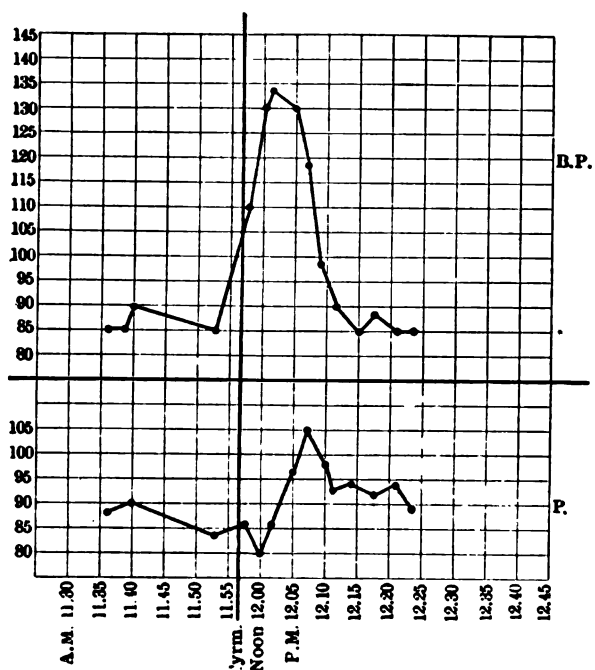


Fig. 15.

Plotted curve showing the result of injecting 40 mg. of tyramine in toxic patient with advanced tuberculosis and marked circulatory weakness. (Author's case.) Blood-pressure taken every five minutes with Janeway's blood-pressure apparatus.

a pregnant woman, probably abortion. Chronic poisoning, seen in Russia, is most commonly caused by eating bread made of rye contaminated with ergot. There are two forms: First, the gangrenous, in which the earlier symptoms are gangrene of the nose and ears, finally of the hands and feet; second, the nervous, with weakness, headache, cramps in the limbs, itching, and epileptiform convulsions, followed sometimes by complete dementia. The treatment is to discover and stop the poisoning.

Therapeutic Application.

To Contract the Uterus.—Ergot produces a continuous contraction in the pregnant uterus by a peripheral action, and is mainly used to prevent postpartum hemorrhage. It is administered after the child's head is down on the perineum, so that it begins to act at about the time the head is born, aiding in the expulsion of the placenta and stopping hemorrhage by contracting the muscular wall of the uterus, thus closing the great venous sinuses. It may be administered earlier during labor only under the following circumstances: When there is placenta previa, before the delivery of the second child of twins, and in a multiparous woman with relaxed uterus and very easily dilated parturient canal.

If given under ordinary circumstances in the first stage of labor it may produce a severe tear in the maternal soft parts, and, in rare cases, rupture of the uterus or strangulation of the child.

Ergot has been used a great deal in the treatment of internal hemorrhage, but as it constricts the blood vessels all over the body, thus causing a rise of blood pressure, its influence, if any, is to increase the hemorrhage. It is, therefore, irrational to use it for this purpose.

In the treatment of relaxing diarrhoea it is often useful, also in the treatment of vasomotor relaxation, such as excessive sweating and shock.

Preparations.—Fluid extract ergot, thirty minims. This is by far the most efficient preparation, but it should be freshly prepared, and must be given by mouth. There are many refined extracts of ergot which are less effective than the above but may

be used hypodermically, such as ergotin, Bonjean-Merck, eight to ten minims.

ERNUTIN.

(Not official.)

This is said to contain ergotoxine, tyramine, and ergamine. The ergotoxine is obtained from ergot, and the tyramine and ergamine are produced synthetically. The dose is 30 to 60 minims by mouth, and 5 to 10 hypodermically. Of **ergotoxine** (not official) alone, the dose is 1/100 of a grain; of **tyramine**, 0.02 gramme, or one-third of a grain (much larger doses of this substance have been given).

HYDRASTIS.

Contains the active principle, hydrastine. Dose, one-half of a grain.

Preparations.—Hydrastinine hydrochloride, an artificial alkaloid produced from hydrastine; dose, one grain.

Hydrastin, a resinoid substance obtained from hydrastis; really an impure hydrastine.

Hydrastis itself, the crude drug, is seldom used internally. Dose, ten grains; fluid extract, thirty minims; tincture, one dram.

Glyceritum hydrastis is largely used as an astringent, sedative, local application in chronic inflammations of the mucous membranes.

Internally the other preparations of hydrastis are used in chronic inflammations of the stomach, but their extremely bitter and unpleasant taste makes them very difficult to administer.

Physiological Action.

Locally.—Irritant.

Cord.—Stimulates the motor side.

Respiration.—Stimulates.

Circulation.—Stimulates the peripheral end of the vagus nerve, slowing the heart, but later depressing and increasing the rate. Stimulates the vasomotor centre. In small doses tends to stimulate the involuntary muscle. Hydrastin hydrochloride is a

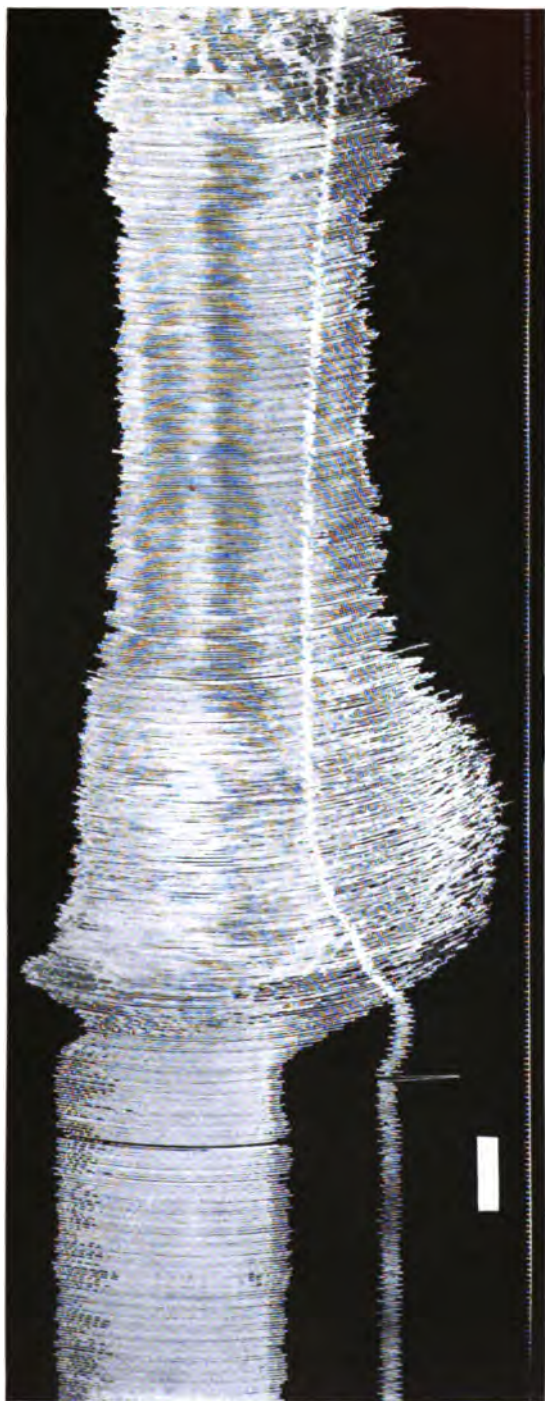


Fig. 16.

Combined cardiographic (downstroke, systole) and blood-pressure tracing showing the action of tyramine. White space indicates where drug was injected. (For description of method see Figs. 3 and 4.) (Courtesy, A. N. Richards, Pharmacological Laboratory, University of Pennsylvania.)

more powerful constrictor of the blood vessels, is less depressing to the heart muscle in large doses, and is probably a depressant to the spinal cord.

These alkaloids have been used hypodermically for practically the same purposes as ergot, but they are much less effective. It is to be noted that the action on the uterus is peripheral.

CHAPTER XXVI.

COUNTER IRRITANTS.

TURPENTINE.

Locally.—Irritant, and in concentrated form will blister.

Physiological Action.

In some doses slightly stimulates the heart and causes some depression of the nervous system; is eliminated by the kidneys, giving the odor of violets to the urine.

Preparations.—*Oleum terbinthinæ*, rectificatum, five minims.

Emulsio olei terebinthinæ, ten minims to the dram. Dose, one-half to one dram.

Linimentum terebinthinæ.

Therapeutic Uses.

Turpentine has been used internally as a stimulating expectorant, and as a carminative to relieve gaseous distension, particularly in the later stages of typhoid fever. It may be given in the form of the emulsion or dropped on sugar. It is a very useful addition to an enema, one-half dram being added to a quart of water. When given internally it may produce marked gastro-intestinal irritation, frequent urination, and sometimes strangury; if continued, albumin and casts, and sometimes blood, may be found in the urine. It has been known to cause abortion in pregnant women.

As an external application the *linimentum terebinthinæ* is valuable in muscular pains, and sometimes for painful joints. The turpentine stupe, made by dipping flannel cloths in hot water, wringing them out, sprinkling them with warm turpentine, and spreading them over the abdomen, often gives great relief in pain due to gaseous distention.

Other official liniments that are used as counter-irritants are:

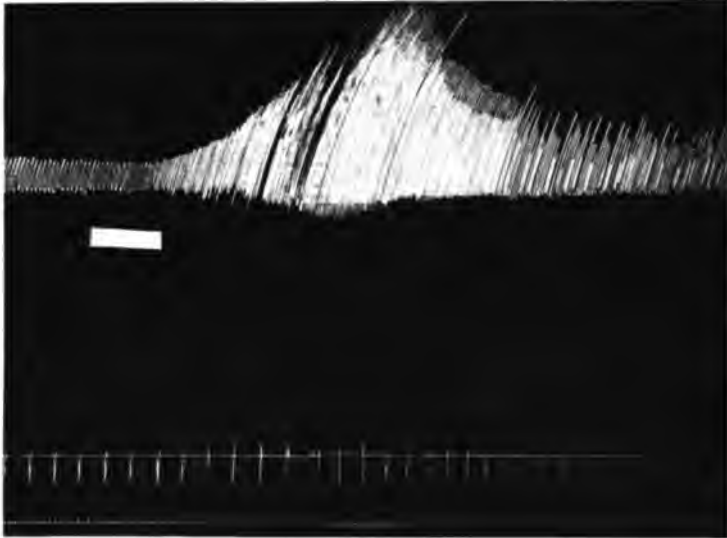


Fig. 17.

Isolated mammalian heart tracing showing action of tyramine, the middle line representing the flow through the coronaries. White space indicates where drug was injected. (For description of method see Fig. 8.) (Courtesy, A. N. Richards, Pharmacological Laboratory, University of Pennsylvania.)

Linimentum ammoniæ, 35 per cent. dilute ammonia water.

Linimentum belladonnæ, really a sedative liniment.

Linimentum calcis, containing lime water and linseed oil, equal parts. Anæsthetic and sedative, and particularly useful in burns.

Linimentum camphoræ, a mild counter-irritant.

Linimentum chloroformi, powerful counter-irritant, but containing so little lubricant that it does not rub easily.

Linimentum saponis, containing six parts of camphor in one hundred.

Linimentum saponis mollis, containing sixty-five parts of soft soap in one hundred of alcohol.

If we wish to make up an original form for a liniment the common base is *oleum gossypii seminis* (cottonseed oil).

OLEUM GAULTHERIÆ.

This is particularly useful in rheumatic joints when you wish to secure the absorption of salicylic acid through the skin. It is, however, extremely expensive, and it is better, therefore, to use the *methyilis salicylas*. We may write thus:

℞ *Methyl Salicyl.*

Ol. Gossypii Seminis, aa fʒi.

M. Sig:—Use externally.

After applying the above the joints should be covered with cotton and oiled silk or paper.

Other counter-irritants that may be used as liniments are:

Capsicum (*oleoresina*), one or two grains to the ounce.

Mustard (*sinapis nigra*), generally used in the form of mustard plaster, one part of mustard to two parts of flour being made into a paste with water, and spread upon gauze, having one or two thicknesses of gauze between the plaster and the skin. It should not be left in place more than a half hour, and never long enough to produce a blister.

Oleum sinapis volatile, an extremely irritant oil, one or two minims to the ounce.

Menthol and camphor combined in equal proportions make an excellent cooling counter-irritant liniment to apply over superficial nerves that are inflamed.

CANTHARIS.

(Spanish fly.)

Physiological Action.

Locally.—Irritant, producing vesication. Given internally moderate doses produce irritation of the gastro-intestinal and the genito-urinary tract. If the drug is continued, pain in the back, frequent urination, albuminous and bloody urine containing casts, and extremely painful vesical tenesmus follow. These symptoms are due to acute nephritis and cystitis produced by the drug. There is usually great thirst.

Therapeutic Application.

Cantharis is by far the best counter-irritant when we wish to produce a blister for the relief of pain. We may write.

R Ceratum Cantharidis, q. s.
Ft. in emplastrum 1 by 2 inches.
Sig:—Use externally as directed.

In applying a cantharides plaster we should remember that enough cantharis may be absorbed through the skin to produce poisoning, so do not have the plaster too large. The skin should be carefully cleansed with soap and water, the plaster placed in position, and kept there by small adhesive strips. It requires from six to eight hours to raise a blister. After the plaster is removed it is well to break the epidermis at the edge, and let out the serum, after which the blister may be treated with 1 per cent. carbolized vaseline. The blister is particularly indicated over a small pleural effusion in the early stages of pleurisy; over inflammation of nerves, as in sciatica; and sometimes for deep-seated inflammation.

There are many emplastra cantharidis on the market, but none at present recognized by the U. S. P. For internal administration tinctura cantharidis, dose one to five minims, is practically always used. This drug may be used internally for the treatment of dysmenorrhœa and amenorrhœa. In

chronic parenchymatous nephritis, chronic pyelitis, chronic cystitis, and chronic urethritis, if of very long standing, the drug is worthy of trial. It is said to be of value in reflex incontinence of urine, and may be of use in sexual exhaustion.

Pyrogallic acid and **chromic acid** are employed locally to destroy tissue and to arrest hemorrhage.

CHAPTER XXVII.

SUBSTANCES USED AS BASES FOR LOCAL APPLICATIONS.

I. LIQUID BASES.

GLYCERINE.

A useful solvent; freely soluble in all proportions of water and alcohol, but insoluble in fixed and volatile oils. Suppositories glycerini, U. S. P., are useful as a cathartic when there is a mass of fæces well down in the rectum. Glycerine takes up water very rapidly. In the form of glycerine tampons, it is used to deplete the pelvic viscera in inflammatory conditions. It is also useful in acute inflammation of the skin, such as chapped hands. As a sedative lotion we might write:

℞ Acid. Boric.
 Sodii Benzoat, aa gr. xxx.
 Glycerin, f℥ii.
 Fluid Extract Hamamelidis, f℥iss.
 Aqua Rosæ, q. s. f℥iil.

M. et Sig:—Use externally.

The pharmacopœia contains a number of glycerites for local application, such as the following:

Glyceritum acidi tannici, glyceritum boroglycerini, 50 per cent.; glyceritum hydrastis, glyceritum phenolis, 20 per cent.

Glycerine is also valuable when added to enemata, an ounce to a quart of water.

PETROLATUM.

Simple soft paraffine (ordinary brown vaseline); useful as an ointment base, but is not a true fat, and should not be used when you wish to get absorption through the skin.

Petrolatum album (white vaseline).

Petrolatum liquidum, a colorless oil and a useful solvent for the volatile oils. It is used internally as a lubricant in chronic constipation; dose one to two drams. For local application in chronic rhinitis we might write:

R Ol. Eucalypti, m. x.
Ol. Caryophyl., m. ss.
Menthol, gr. ii.
Camphor, gr. v.
Petrolati, q. s. f̄ij.
M. Sig:—Use as a spray.

II. OINTMENT BASES.

CATAPLASMA KAOLINI.

A mildly antiseptic clay paste, containing 37.5 parts of glycerine, 4.5 parts boric acid, two parts methyl salicylate, and one-half part each of thymol and oil of peppermint. Useful as a poultice and fixation dressing in sprains, bruises, and sometimes in the bronchitis of children. Of no greater value than any other form of poultice save that it produces more fixation.

ADEPS.

(Lard.)

This soon becomes rancid, therefore we usually prescribe lard containing a little benzoin for a preservative, as *adeps benzoïnatus*. This is a true fat, and is very useful as an ointment base. *Adeps lanæ*, purified wool fat, a viscid, slightly yellow ointment, is seldom used as such, but *adeps lanæ hydrosus* (lanolin), containing 30 per cent. of water, is a very valuable base, because it is absorbed through the skin; it is capable of taking up more than its own weight of water, is not saponified by an alkali, and does not become rancid.

III. DUSTING POWDERS.

AMYLUM.

(Starch.)

Is useful for making pastes, and as a basis for dusting powder, but if used for this purpose where there is moisture it is likely to become sticky.

When tablets containing insoluble substances, such as bismuth, are made up with arrowroot starch, on coming in contact with moisture the starch swells, the tablet bursts open,

and the bismuth or remedial agent is finely divided and exerts its medicinal effect. If the physician is compelled to use tablets, they may be easily tested by dropping them into water. A tablet properly made should almost immediately disintegrate.

TALCUM PURIFICATUM.

(Native hydrous magnesium silicate.)

This is an inert powder which may be used to convey medicinal agents, such as boric acid. When we wish to make an antiseptic dusting powder it is superior to starch in that it does not cake. We might write:

℞ Hg. Chlor. Mit., gr. xx.
Acid. Boric.
Sod. Benz., aa ʒii.
Talc. Purific., q. s. ʒi.

M. Sig:—Use externally.

The National Formulary contains an excellent powder known as *pulvis antisepticus*, containing carbolic acid, eucalyptus, menthol, and thymol, aa. .1 per cent.; salicylic acid, .5 per cent.; zinci sulphatis, 12.5 per cent.; acidi borici, 86.6 per cent., it may be used as a mild antiseptic solution in the strength of one tablespoonful to the pint as a douche, or as an astringent dusting powder.

Pulvis aromaticus, a mixture of Saigon cinnamon, ginger, cardamon, and myristica; five to fifteen grains of this may be added to powders to mask an unpleasant taste or odor.

IV. VEHICLES.

GLYCYRRHIZA.

(Licorice.)

Fluid extract, thirty minims. *Extractum glycyrrhizæ purum*, fifteen grains; *mistura glycyrrhizæ composita*, containing twelve parts of tr. opii camph., six parts of vinum antimonii, three parts of spiritus ætheris nitrosi to one hundred parts of water; used mainly as a vehicle for ammonium chloride. *Pulvis glycyrrhizæ compositus*, containing senna; used as a laxative. *Elixir adjuvans*, containing 12 per cent. licorice, about

37.5 per cent. alcohol; said to be useful to disguise the taste of quinine; the quinine should not be dissolved with acid, but simply held in suspension.

Acacia, Tragacanth and Chondrus.—These substances are used as emulsifying agents, acacia most commonly. They should not be prescribed with alcohol.

ELIXIR AROMATICUS.

Contains 37.5 parts of alcohol, is of agreeable taste, and a useful vehicle for alcoholic preparations.

SYRUPUS AURANTII.

Made from sweet orange peel. The bitter orange preparations have some stomachic action; the sweet orange is used mainly as a flavor. Another alcoholic vehicle containing the oil of orange is *spiritus aurantii compositus*, which is strongly alcoholic (62.5 per cent).

ELIXIR ERIODICTYI AROMATICUM, N. F.

Said to be an excellent vehicle to disguise the taste of quinine.

V. IMPORTANT FLAVORING WATERS. SATURATED SOLUTIONS OF THE VOLATILE OILS.

Aqua amygdalæ amaræ (bitter almond water), *aqua anisi* (anise water), *aqua aurantii florum* (orange flower water), *aqua cinnamomi* (cinnamon water), *aqua menthæ piperitæ* (peppermint water). These may be given in doses of from one to four drams. Dose of the oils, one minim, and of the spirits, five to ten minims. *Aqua rosæ* (water flavored with the oil of rose); useful as a vehicle for skin lotions. The oil of rose itself costs from five to ten cents a drop, but one drop is amply sufficient to flavor an ounce of lotion or ointment.

For a mild sedative skin lotion we might write:

R *Acid. Borici.*
 Sod. Benz., aa gr. xxx.
 Aqua Hamamelidis, f℥iss.
 Phenol, gr. v.
 Aq. Rosæ, q. s. f℥iil.

M. et Sig:—Use externally.

SACCHARIN.**(Benzosulphinidum.)**

Used as a substitute for sugar, mainly by diabetics; a half grain of saccharin is equal to about one teaspoonful of sugar. It is said by some to tend to arrest the digestive processes; therefore should not be used to excess.

VI. COLORING AGENTS.**TINCTURE PERSIONIS COMPOSITA (N. F.).**

Simply for the purpose of coloring external applications red; commonly known as cudbear. The simple tincture persionis gives a bright red color, the compound tincture a reddish brown tint. They may be used in proportions of five to ten minims to the ounce.

COCCUS (U. S. P.).

Produces a red color.

CROCUS.**(Saffron.)**

Gives a yellow color.

VII. PROTECTIVES.

Collodium and Collodium Flexile.—The latter contains turpentine and castor oil; it does not contract as does ordinary collodium. When applying collodium it is well to place a little cotton or lint over the wound first, so as not to seal it up completely.

CHAPTER XXVIII.

ANTISEPTICS.

ICHTHYOL.

A non-official preparation; a very complex chemical substance obtained by dry distillation of fossil bituminous shale. It may be prescribed in solution, in water, or, more commonly, in ointment. As:

R Ichthyol, f3℥.

Adeps Benz., q. s. ℥i.

M. Sig:—Use externally.

The substance has been used for many different indications. It seems to be the most helpful in adenitis and acute inflammations of the skin. It is often applied to carbuncles and boils with doubtful benefit. It has also been used internally in doses from three to thirty minims in phthisis, and for high blood pressure.

RESORCIN.

Very soluble in water and alcohol; dose, internally, two grains; externally, 1 to 5 per cent. in ointment or solution. It is particularly valuable in chronic diseases of the skin, such as eczema. We may write:

R Resorcin, gr. xv.

Adip. Lan. Hydr., ℥i.

M. Sig:—Use externally.

CHRYSAROBIN.

An anti-parasitic used externally, particularly in the treatment of psoriasis. We may write:

R Chrysarobini, gr. x.

Adeps Benz., ℥i.

The substance is generally applied after the patient has taken a hot bath. It produces a dark-brown stain.

Or we may use unguentum chrysarobini, U. S. P., 6 per cent.,

which is too strong for external use without dilution, usually with lard. It is said that the stain may be removed by lime water.

CALAMINE.

A mixture of native carbonate and salicylate of zinc, used as a mild sedative and antiseptic in skin diseases. It has the advantage of being almost exactly the same color as the flesh. It may be prescribed in suspension with aquæ calcis, as follows:

℞ Pulvis Calaminæ, 3℥.
Glycerini, f℥℥.
Aq. Calcis, q. s. f℥℥℥.
M. Sig:—Use externally.

POTASSIUM CHLORATE.

A useful antiseptic in the mouth or in the rectum; soluble in sixteen parts of water; often combined with rhus glabra as a gargle in sub-acute sore throat.

℞ Potassii Chloratis, 3℥.
Fl. Ex. Rhus. Glab., f℥ss.
Ay. Cinnamomi, q. s. f℥℥℥.
M. Sig:—Use as a gargle.

AQUA HYDROGENII DIOXIDI.

Containing 3 per cent. hydrogen dioxide; usually diluted one to four; mildly antiseptic, but particularly valuable for the destruction of pus. Should be injected into cavities where there is not free drainage with great caution, because the gas produced may break up adhesions.

LIQUOR FORMALDEHYDI.

An aqueous solution containing 37 per cent. formaldehyde, and produced from methyl alcohol. Useful in weak solution as an antiseptic to the skin; very irritant to all mucous membranes, and has a tendency to harden living tissue. Very effective for disinfecting dwelling houses, as it does not destroy or injure fabrics. It may be used as a spray, or volatilized from solution by heat, or by the addition of permanganate. It requires about five ounces of a 40 per cent. solution of formaldehyde for each 1000 cubic feet

of space. The room should be left closed for from twenty-four to forty-eight hours after disinfection.

CHLORINATED LIME.

(Calx chlorinata.)

Very useful as a disinfectant of stools and urine, because it is a powerful oxidizer as well as a cheap disinfectant. Two or three ounces should be added to each movement, and left in contact for at least half an hour.

FERROUS SULPHATE.

(Copperas.)

Useful as a cheap antiseptic outside the body.

COPPER SULPHATE.

Is useful in very dilute solution, particularly for destroying the larvæ of the malarial-bearing mosquitos.

ARGENTIC NITRATE.

Is not a powerful antiseptic outside the body, as it is destroyed by albuminous substances.

BICHLORIDE OF MERCURY.

(Hydrarg. chlor. corrosivum.)

In 1 to 4000 solution is an effective antiseptic. It may be used as a vaginal douche, but should be followed by a saline solution. Useful also as an antiseptic for the hands.

HYDRARGYRI IODIDUM RUBRUM.

Is a more powerful antiseptic than is the bichloride. May be used in strengths from 1 to 5000, but is only soluble in the presence of potassium iodide. **Antiseptic tablets** can be obtained which contain mercuric potassium iodide, producing in solution the hydrargyri iodidum rubrum. This has the advantage over the bichloride of not corroding instruments if used in a strength not exceeding 1 to 2000.

PHENOL.
(Carbolic acid.)

Has already been discussed as an antiseptic. It is active in the strength of 1 to 50.

BENZOIC ACID.

Is mildy antiseptic; probably a little more so than boric acid. May be used in mouth washes, and often internally to increase the acidity of the urine. Sodium benzoate may be given in doses from five to ten grains.

THYMOL.

Chiefly used internally, in thirty-grain capsules, for the destruction of the hookworm.

CHAPTER XXIX.

MINERAL ACIDS.

All produce gastro-enteritis. The antidote is an alkali, such as soap, chalk, etc. They are all used externally as caustics.

Sulphuric acid, *acidum sulphuricum dilutum*, minims ten; used internally as an astringent. Produces a black stain.

Nitro-hydrochloric acid, minims five; the strong preparation should always be used; it should be freshly prepared, and allowed to stand for twenty-four hours. Useful in gastro-intestinal fermentation and oxaluria. It makes a yellow stain.

Nitric acid, *acidum nitricum*, produces a yellow stain.

Hydrochloric acid, *acidum hydrochloricum*, has been discussed under digestants.

CHAPTER XXX.

PROPRIETARY MEDICINES AND DISPENSING.

A proprietary or patent medicine is one which has a copy-righted name and label, the formula being known only to the manufacturer, and changeable at will; for example *Swamp Root*. This mixture has been slightly modified to meet the letter, but not the spirit, of the Pure Food and Drugs Act, of June, 1906. It contains a syrup, a small amount of balsam, 8.55 per cent. of alcohol, a laxative principle, some wintergreen, juniper, and cardamon. It has no definite medicinal properties, so far as the Council of Pharmacy could determine. If taken in large quantities when the kidneys are diseased, in which cases it is highly recommended, it may do serious injury because of the alcoholic content. Such a preparation has no legitimate place in medicine. The purpose of the manufacturer is purely commercial, and the sale of the product is due solely to the psychic impression brought about through clever advertising.

A patented medicine, on the other hand, is a perfectly legitimate remedy for a physician to use if he is convinced that it is of definite value in a given case. For instance, a chemist discovers a compound of salicylic acid that is less disturbing to the stomach than the ordinary salts, and patents its preparation, giving the formula in full to the Patent Office at Washington, where any one may read it. He then gives his product a name; the particular chemical formula with the name then becomes his property until the patent expires. But he must always, under this name, dispense exactly the thing he has patented. Aspirin is a good example of the above, it being really acetyl salicylic acid. It possesses certain definite advantages over the older salicylic acid salts, and is a perfectly ethical preparation.

There is another class of remedies which stand between the proprietary and the patented, which should be mentioned.

The wholesale drug manufacturing houses are constantly sending out samples containing a large number of ingredients with high-sounding and often unknown names, the label being very at-

tractive, and the preparation pleasant in taste. If the physician takes the trouble to look up the drugs, he usually finds that they are old remedies under unusual names. As a rule, these complex, set preparations had better be avoided unless the physician sees a definite, rational, physiological basis for their use. We are most likely to prescribe the drug with the most familiar name; hence the manufacturing chemist invents an easily remembered name, constantly keeping it before the public by clever advertising, and obtaining good-will by numerous small presents. As has been already intimated, patented medicines have a definite and legitimate place, but we must always remember that we are paying an enormous price for the patented name; therefore, if the Pharmacopœia or the National Formulary contain a substance with practically the same action, we should give the official preparation the preference. In practice, it will be found that many of these official drugs are so little known that the druggists do not keep them in stock.

Veronal is a very common, well-known, and useful hypnotic, but *aethylis carbanas* (ethyl carbanate), dose 10 grains, belongs to the same chemical group as *veronal*, and has practically the same physiological action save that the dose is slightly larger. *Urotropin* as a urinary antiseptic is familiar, but hexamethylenamina (hexamethylenamine) U. S. P., practically the same substance and much cheaper, is still unknown to many of the profession. *Lysol* and *liquor cresolis compositus*, U. S. P., *antiphlogistine* and *cataplasma kaolini*, U. S. P., are other examples; also certain mixtures, such as Tyree's Antiseptic Powder (a much advertised preparation, the formula for which has been repeatedly changed), which is a mildly antiseptic substance, possessing no advantages over *pulvis antisepticus solubilis*, N. F., and Phillips' Milk of Magnesia, an excellent preparation, but in no way superior to *magnesia magma*, N. F., if the latter be properly made.

Now, the objection that naturally arises is that if one prescribes these official preparations, it is difficult to be sure that the corner druggist can properly make up the product, and this is a very practical objection; but a glance through the catalogues of the large manufacturing chemists will show that they are listing most of these official preparations, and if the physician will take the trouble he may easily secure them.

The question may also be asked, "How can the official preparation be the same as the unofficial, if the latter is patented?" After the patent is exhausted any one can legally make the product; or, if the patent is dependent (as is very commonly the case) upon some unessential trick of manufacture, then practically the same thing can be produced by those who do not hold the patent. I am not, understand me, arguing against the patented remedy if it really possesses special virtue, but only against it when its use depends exclusively on commercial advertising, and there exists an official substance just as useful.

The Patent Medicine Fraud.¹

A little more about Swamp Root. In the *Journal of the American Medical Association*, June 20, 1912, will be found an interesting comparison of the labels of Swamp Root for England and America, both labels being the same before the passage of the Pure Food and Drugs Act.

BRITISH LABEL.

"Swamp Root, Kidney, Liver and Bladder Cure."

"Cures acute and chronic kidney, liver, bladder and urinary disorders, Bright's disease, dropsy, swelling of the feet, pain in the back, joints, bones or rheumatism."

"Restores disordered liver to a healthy condition, corrects constipation."

"Enriches the blood, kills hereditary taint of scrofula, erysipelas, salt rheum, cancer, humor or old ulcers."

"It cures skin diseases and all disorders arising from an impure state of blood."

[No mention of alcoholic content.]

"This great specific cures . . . Bright's disease."

"Dissolves, expels gravel, stone in bladder."

AMERICAN LABEL

"Swamp Root, Kidney, Liver and Bladder Remedy."

"Numerous testimonials are to the effect that it has been used with benefit in cases which have been diagnosed as acute and chronic kidney, liver, bladder, urinary disorders, pain in back, joints, bones and rheumatism and Bright's disease."

[Statement eliminated.]

[Statement eliminated.]

[Statement eliminated.]

"Swamp Root contains 9 per cent. pure grain alcohol."

"This is recommended for . . . troubles which often lead to Bright's disease."

[Statement eliminated.]

¹The "Propaganda for Reform," A. M. A., has been freely used in the preparation of this chapter.

"It heals and cures irritation, inflammation, ulceration or catarrh of bladder."

"It proves of great value in most cases that are diagnosed as irritation, inflammation, ulceration or catarrh of bladder."

"Builds up a run down constitution and is the best remedy and most reliable for liver complaints, torpid liver and biliousness."

"It is intended as a remedy for a run down constitution, liver complaint, torpid liver and biliousness."

"Expels gallstones."

[Statement eliminated.]

"It cures enlargement of prostate gland, seminal weakness, spermatorrhea, impotence, generative debility and general languor."

"It will be found very beneficial in cases of debility."

"Drives malarial poison out of system."

[Statement eliminated.]

"Cures when all other remedies have failed."

[Statement eliminated.]

"It purifies the blood."

[Statement eliminated.]

I quote the comparison direct from the *Journal*. It is perfectly evident that the manufacturer is attempting to evade the law, not to comply with it. It indicates also the value of the law in compelling him to eliminate from the label some of the absolute fallacies which still continue in the British edition. I have already given approximately the formula for Swamp Root, and the effects of alcohol in Bright's disease, if given continuously during long periods of time. A laxative principle is sometimes indicated, but there are many cases of nephritis in which the long-continued use of laxatives is contra-indicated. It is evident that the label, as quoted above, is distinctly misleading in its purport, and really designed to fool the public.

The fortune reaped by the sale of Kilmer's Swamp Root is estimated at from \$10,000,000 to \$15,000,000, and the Kilmers wield a powerful political influence in Binghamton, N. Y., where it is made. To quote directly from a popular article, published in *Collier's*, May 11, 1912, "All this wealth, all this power, all this influence, rests on a foundation of pure fraud and knavery, and has been built up by a business acumen as disreputable as that of the card sharp, as ruthless as that of the burglar who will kill, if need be, in order to make his haul. The prescribed dose of Swamp Root is 1, 2, or 3 or more teaspoonfuls (without limit) 4 times a day."

Here is the method of the manufacturers of Swamp Root for

diagnosing Bright's disease. They printed on the wrapper the following:

"Fill a bottle or common glass with urine, and let it stand 24 hours. A sediment or settling usually indicates an unhealthy condition of the kidneys." This is obviously absurd. Any normal urine, particularly if set in a cold place, will show a deposit in a few hours, and this indicates nothing pathological whatever. Some years ago, the Kilmers offered to make urinary analyses. The Postoffice inspectors sent samples of weak tea and of horse urine. The reply came back to all of these, giving an analysis, stating the dangerous condition of the kidneys, and recommending to each to take Swamp Root and be saved. After an inspection of the factory, and the finding of no laboratory for urinalysis, a recommendation for a fraud order was issued, but this recommendation, probably for political reasons, was never carried out. As indicated in the article in *Collier's*, there are three definite counts against the manufacturers of Swamp Root: 1. Purporting to report findings from an analysis of urine which was never made. 2. Dispensing and prescribing for disease without a license to practise medicine. 3. Selling Swamp Root to persons entirely free from kidney disease on false representations that they were suffering from such disease.

Because of the enormous income to newspapers for advertising patent medicines, there is a tendency on the part of the press to support such legislation as is favorable to the nostrums. It is stated that \$40,000,000 annually are paid for advertisements of nostrums.

Patent Cough Remedies.

Peruna, *Liquozone*, *Duffy's Malt Whiskey*, and *Pierce's Golden Medical Discovery* all include tuberculosis in their list of curable diseases. Most patented consumption cures have for a basis either alcohol or a cough sedative such as morphine or codeine. It has practically been proven that alcohol is of little or no value in the treatment of tuberculosis, and nothing is more certain in medical science than the fact that if you stop the cough by direct depression of the respiratory centre, when there is active purulent expectoration, this material is retained, and much of the toxic matter is absorbed. The patient then becomes septic, and much worse.

Proprietary Remedies that Contain Habit-Forming Drugs.

CANNABIS INDICA.

One Day Cough Cure (also mor- Piso's Cure.
phin).

CHLORAL.

Capitol. D. D. D. Remedy.

COCAIN.

Agnew's Powder. Coco-Bola.
Anglo-American Catarrh Powder. Tucker's Asthma Cure.

OPIUM AND ITS DERIVATIVES.

Boschee's German Syrup (mor- phin).	Harrison's Opium Elixir (opium)
Brou's Injection (morphin).	Hooper's Anodyne, The Infant's Friend (morphin).
Carney's Common Sense Cure (morphin).	Jayne's Expectorant (opium).
Children's Comfort (morphin).	Maguire's Compound Extract Benne (morphin).
Colwell's Egyptian Oil (opium).	Mexican Oil (opium).
Crossman's Specific Mixture (opium).	Mrs. Winslow's Soothing Syrup (morphin).
Dr. Drake's German Croup Rem- edy (opium).	One Day Cough Cure (morphin, also cannabis indica).
Dr. Fahrney's Teething Syrup (morphin).	Petit's Eye Salve (morphin).
Dr. James' Soothing Syrup (heroin).	Pierce's Smart Weed (opium).
Dr. Seth Arnold's Cough Killer (morphin).	Rexal Cholera Cure (opium).
Dr. Moffett's Teethina; Teething Powders (opium).	Shiloh's Cure (heroin).
Godfrey's Cordial (opium).	Taylor's Sweet Gum and Mullein Compound (morphin).
Gowan's Pneumonia Cure (opium).	Tousley's Sneezless Snuff (mor- phin).
Habitina (morphin).	Tubercine (opium).
	Victor Lung Syrup (opium).
	Watkin's Anodyne (heroin).
	Wright's Instant Relief (opium).

Preparations Containing Sufficient Alcohol to Demand a Liquor Tax.

NAME OF PREPARATION	ALCOHOL PER CENT.
Angostura Aromatic Tincture Bitters.....	45.00
Aromatic Bitters.	42.14
Atwood's La Grippe Specific.....	32.70
Augauer Kidney Aid.....	35.65
Belvedere Stomach Bitters.....	20.32
Bismarck Laxative Bitters.....	21.14
Bismarck's Royal Nerve Tonic.....	20.67
Blackberry Cordial (Strother Drug Co.).....	21.50
Blackberry and Ginger Cordial (Standard Chemical Co.).....	25.62
Black Tonic.	44.62
Bonekamp Stomach Bitters.....	20.34
Bonekamp Bitters.	37.03
Brown's Aromatic Cordial Bitters.....	42.14
Brown's Vin Nerva Tonic.....	27.32
Botanic Bitters.	20.44

NAME OF PREPARATION	ALCOHOL PER CENT.
Cinchona Bitters.	27.44
Clifford's Cherry Cure.	35.90
Clifford's Peruvian Elixir.	24.77
Crescent Star Jamaica Ginger.	42.65
Cuban Gingeric.	31.09
Dandelion Bitters.	30.15
De Witt's Stomach Bitters.	23.86
Dr. Brown's Blackberry Cordial.	29.04
Dr. Hoffman's Golden Bitters.	26.30
Dr. Sterki's Ohio Bitters.	21.67
Dr. Dade's Blackberry Cordial.	28.84
Dr. Bouvier's Buchu Gin.	39.88
Dr. Fowler's Meat and Malt.	33.70
Dr. Worme's Gesundheit Bitters.	27.92
Dr. Rattinger's Bitters.	27.10
Ducro's Alimentary Elixir.	23.01
Elixir Calisaya.	22.96
Ferro China Bascal.	32.10
Ferro China Bissler.	28.87
Gastrophan.	26.10
Gentian Bitters.	39.95
Gilbert's Rejuvenating Iron and Herb Juice.	23.81
Ginger Tonic.	25.81
Glycerine Tonic (Elixir Pepsin)	39.72
Green's Chill Tonic.	37.88
Jack Pot Laxative Bitter Tonic.	24.95
Juni-Kola.	22.89
Juniper Kidney Cure.	24.21
Karlsbader Stomach Bitters.	21.56
Katarno.	27.60
K. K. K.	24.12
Kola and Celery Bitters.	20.68
Kreuzberger's Stomach Bitters.	40.22
Kudros.	29.33
Lemon Ginger.	28.88
Meta Multa.	32.98
Milburn's Kola and Celery Bitters.	20.68
Neuropin.	32.02
O'Hare's Bitters.	44.93
Old Dr. Jacques Stomach Bitters.	40.02
Old Dr. Scroggin's Bitters.	24.74
Our Ginger Brandy.	26.24
Panama Bitters.	32.83
Pepsin Stomach Bitters.	34.96
Peptonic Stomach Bitters.	23.12
Rockandy Cough Cure.	23.85
Severa's Stomach Bitters.	22.66
Smith's Bitters.	34.41
Steinkonig's Stomach Bitters.	32.05
Tatra (Latra).	22.90
Tolu Rock and Rye.	30.08
True's Magnetic Cordial.	26.09
U-Go.	32.14
Uncle Josh's Dyspepsia Cure.	30.06
Westphalia Stomach Bitters.	31.96
William's Kidney Relief.	37.00

Headache Cures.

Ammonol contains acetanilid, 50 parts, soda bicarbonate, 25, and ammonium carbonate, 20. *Antikamnia* contains acetanilid, 68 parts, caffeine 5 parts, citric acid, 5 parts, and soda bicarbonate, 20 parts. *Orangeine* contains acetanilid, 43 parts, soda bicarbonate, 18, and caffeine 10. *Bromidia* contains chloral as its most active ingredient (see text under Cardiac Depression). *Bromo-Seltzer* contains in 76 grains, or one heaping teaspoonful, potassium bromide 7 grains, acetanilid 3 grains, and caffeine 8 grains. A half ounce is often taken at a dose, and taken by some individuals every day; this represents a very large dose of caffeine. It may be noted that caffeine is the active ingredient in certain drinks sold at the soda water fountain, particularly Coca-Cola, which contains approximately 3 grains of caffeine to the glass. The excessive use of Coca-Cola is not infrequently the cause of so-called neurasthenia. It will be noted that most headache powders contain acetanilid, though it is probably the most toxic of all the coal-tar antipyretics.

Miscellaneous Proprieties.

Buffalo Lithia Water contains but the merest trace of lithia. The therapeutic effect of waters of this type is mainly psychic, together with the benefit of the increased amount of water ingested.

Anasarcin, the main action of which is due to squill, is said to contain the active principles of oxydendron, sambucus, hepatica, and potassium nitrate. It is to be noted that the active principle of most of these substances is unknown.

Papayans Bell consists essentially of sodium bicarbonate, charcoal, and a little flavoring matter. The Council was unable to find any digestive power for starch or albumen. The enormous sale of this product is the result of widespread advertising, largely, though inadvertently, through physicians themselves.

Phenol Sodique "contains from 0.5 to 0.66 per cent. of phenols dissolved in about 0.75 per cent. of sodium hydroxid. It appears to be essentially a very dilute alkaline solution of some impure coal-tar product, presumably of crude carbolic acid." The substance has mild antiseptic qualities, but the claims made for it are

much exaggerated. It probably has no more value than a 2 per cent. solution of carbolic.

Vin Mariani "corresponds to a mixture of an alcoholic extract from coca leaves and an ordinary Bordeaux wine; it contains about 6 per cent. of sugar. The product is advertised in this country as being recommended by a host of eminent foreigners for almost everything, while abroad illustrious Americans are similarly quoted."

Burnham's Soluble Iodin has probably no advantage over Lugol's solution (*Liquor Iodi Compositus*, U. S. P.).

Unguentine.—This "contains no alum, but aluminum acetate (small amounts of alum may be present as impurities in the aluminum acetate) and zinc oxid, or, more probably, impure zinc carbonate, and the entire quantity of both does not exceed 5 per cent. It contains no ichthyol or, if any, but the merest trace, and less than one per cent. of phenol. The aromatic oils amount to no more than approximately one per cent., in all. The ointment base is, in the main, petroleum."

Castoria probably has no advantage over the U. S. P. syrup of senna, and is approximately of the same composition. Senna, however, is not a particularly good remedy for young infants, as it is likely to produce habitual constipation.

Munyon's Special Catarrh Cure consists of a solution of a little common salt with a trace of carbolic acid.

Enteronol, "the greatest germicide known to science."—The formula for this is given on the bottle, and reads as follows: "Ipecac, subnitrate of bismuth, latalia rad., camphor, lupulin, caffeine, and rheum." "Latalia rad." seems to be an absolutely unknown substance. Examination revealed the presence of rhubarb and ginger, but of no lupulin, ipecac, caffeine, or bismuth. This is an excellent example of the fake formula in advertising. The formula on the label states that it contains $\frac{1}{4}$ of a grain of opium. "Latalia rad." was subsequently removed from the label.

Warner's Safe Cure "shows the presence of potassium nitrate, alcohol, glycerine, a trace of oil of wintergreen, and vegetable extractives. No alkaloid or similar active principle was found. All its properties point strongly to its consisting largely of taraxacum with some other extract containing a small quantity of tannin."

Munyon's Kidney Cure contains only sugar, so far as can be determined.

Pepto-Mangan, a very widely advertised preparation of iron, is probably in no way superior to the official preparations; in fact, the Government found, after a trial, that it was of less value than the well-known official products.

Meat Juices.

The food value of these lies largely in the coagulable and other proteid materials present.

In 500 grammes (approximately 16 oz.) of round beef, cold pressed, there are.....	262.32 calories
In 500 grammes (approximately 16 oz.) of Beef Juice (John Wyeth), there are.....	154.56 calories
In 500 grammes (approximately 16 oz.) of Bovinine, there are.....	339.12 calories
In 500 grammes (approximately 16 oz.) of M. J. Valentine's Beef Juice, there are.....	135.12 calories

(Note.—These caloric values do not include sugar, alcohol, nor any other added substance.)

Valentine's Beef Juice is dispensed in two ounce vials at \$1.00 a bottle. The contents, therefore, represent about 18 calories of food value in proteid. At is requires about 2,000 calories to keep a man nourished when at rest, it would take about 111 bottles a day of this extract to feed him, and then he would be getting a great excess of proteid. Two fluid ounces of milk equal about 46 calories; it would then require about six pints of milk at a cost of 24 cents to give 2,000 calories, and the man would be getting proteid, fat, and carbohydrates. This is, of course, comparing the proteid value of the extract with the total food value of the milk; but the only important food factor in the extract is the proteid. The above figures are approximate.

It is evident that these extracts are fairly high in proteid food value, but the amount taken is so small that their power to nourish becomes practically *nil*. You cannot count alcohol as added food. If we give a typhoid patient a tablespoonful of one of these extracts every two or three hours, and delude ourselves by thinking that he is being nourished with a concentrated food, we are, in fact, practically starving the patient, and it is here that misrepre-

sentation does most harm. These preparations are sometimes of use when we wish to withhold food from the patient and, at the same time, let him think that he is taking nourishment. They are also of some value in stimulating the appetite, and are occasionally well borne by an irritable stomach, but their true food value must be clearly understood.

From the discussion of these examples it is evident that the worst crime of the patent medicine manufacturer is misrepresentation.

WHAT SHALL THE DOCTOR DISPENSE?

As has been many times intimated in this book, the modern tendency in scientific medicine is to simplicity in prescribing. Go into any up-to-date medical ward of a hospital, and study the treatment charts. In most instances it will be apparent that the patients are receiving very few mixtures, but, rather, single drugs with a definite physiological effect. So elaborate and complex have become the formulas of tablets put up by enterprising manufacturing chemists that the physician is tempted to use these ready-made mixtures, and thus make this drug treatment complex and indefinite.

A word or two about tablets. Every tablet used by a physician should be first tested in warm water to see if it will rapidly disintegrate. As a rule, unless taste forbids, uncoated tablets are preferable to the coated. Tablets of bismuth subnitrate, salol, or other insoluble substances, are perfectly admissible in tablet form provided that the menstruum is starch or a like substance that swells up on contact with moisture, thus disintegrating the tablet. Tablets made of evaporated tinctures should be avoided as unreliable. Tablets said to contain very volatile substances, such as chloroform, are absurd. It is well understood that every physician has his own combinations. The following is a simple list, which, it seems to the author, will meet the majority of everyday indications. The prescription blank is usually preferable to dispensing in the office, unless the circumstances make this impossible.

Strychnia sulphate.	gr. 1/30	
Atropine sulphate.	gr. 1/200	
Cocaine hydrochlorate.	gr. 1/4	
Morphia sulphate.	gr. 1/10	
Codeine sulphate.	gr. 1/4	
Nitroglycerine (coated).	gr. 1/200	
Antipyrine.	gr. 2 and 1/2	
Caffeine citrated.	gr. 5	
Bismuth subnitrate.	gr. 5	
Phenol salicylate.	gr. 5	
Hexamethylenamina.	gr. 5	
Ethyl carbonate, or better veronal.	gr. 5	
Pulvis creta compositus.	gr. 5	
Arseni trioxidum.	gr. 1/40	
Massa ferri carbonatus (Blaud's pill).	gr. 5	
Ammonium salicylate.	gr. 5	
Quinine bisulphate.	gr. 5	
Hydr. chloridi mite.	gr. 1/10	
Potassium iodide.	gr. 5	
Hydr. iodum flavum.	gr. 1/5	
Ext. rhamnus purshiana.	gr. 2	
Soda bicarbonate.	gr. 2	} 1 tablet placebo
Oil of peppermint.	(m. 1/8)	
Carbol. lignum.	gr. 3	
Ammonia chloride.	gr. 5	
Potassium chlorate.	gr. 5	

APPENDIX.

NEW AND NONOFFICIAL REMEDIES.

The author has made a selection of what he considers the *most important* from the list of medicinal substances which, prior to January 1, 1913, have been examined by the Council on Pharmacy and Chemistry of the American Medical Association, which appeared to comply with the rules of the Council and which, therefore, were accepted for inclusion in the annual "New and Nonofficial Remedies." The acceptance of the articles included in the above mentioned book has been based in part on evidence supplied by the manufacturer or his agent, and in part on investigation made by or under the direction of the Council.

The Council desires physicians to understand that the acceptance of an article does not necessarily mean a recommendation, but that so far as known it complies with the rules adopted by the Council.

Permission to publish the matter contained in this appendix from "New and Nonofficial Remedies" has been granted by the Council on Pharmacy and Chemistry of the American Medical Association.

List of Remedies.

AGAR-AGAR.—Agar-agar is a substance extracted in the East Indies from various sea weeds.

This substance seems to come principally from *Eucheuma gelatinum*, *E. spinosum* (Linné) J. Agardh., *Gelidium corneum* (Hudson) Lam., *G. cartilagineum* Gaill., *Glolopeltis tenax* (Turner) J. Agardh., and *Gracelaria lichenoides*.

Agar-agar is extracted by hot water and dried for commercial purposes in the form of bundles of shreds, or powder form. It is odorless and insipid, insoluble in cold water, but soluble in hot water. A solution containing 1.5 per cent. gives quite a stiff jelly on cooling.

Agar-agar consists practically of gelose, which dissolves in 500 parts of water and is precipitated in an impure form by alcohol. Gelose is a carbohydrate which is converted into galactose on boiling with dilute sulphuric acid. On drying at 100° C. (212° F.) agar-agar loses about 20 per cent. of water; 100 parts of dry substance furnish about 4 parts of ash, which, when treated with hydrochloric acid and examined with the microscope, shows the presence of diatoms, the most characteristic of which are *Arachnoidiscus*—Ehrenbergii Baill., and several *Grammatophora* and *Cocconeis*. An aqueous solution of agar-agar gives no precipitate

with solution of tannic acid (absence of gelatin), and no blue color with solution of iodine (absence of starch).

Actions and Uses.—Agar-agar absorbs water in the stomach and intestines and forms a jelly, which being indigestible increases the bulk of the feces.

It is employed for the treatment of constipation.

Dosage.—From 5 to 15 Gm. (75 to 240 grains). Agar-agar is administered in substance, coarsely comminuted and taken in water or mixed with food. It may be added to the dough before baking biscuits, cakes, etc.

AGARIC ACID.—*Acidum Agaricum.*—*Acidum Agaricinicum* (Pharm. Helvetica, edit. 4). *Agaricinum*¹ (Pharm. Danica, edit. 1907). A tri-basic acid, $C_{19}H_{38}OH(COOH)_3 + 1\frac{1}{2}H_2O$, derived from *Polyporus officinalis*, Fries (Order Hymenomycetes; fam. Polyporeæ) a fungus growing on the European Larch and other species of larch.

Agaric acid occurs as an odorless, tasteless, glistening micro-crystalline powder, which melts at $141.5-142^\circ C.$ ($286.5-287.5^\circ F.$). When heated to a high temperature it is volatilized in the form of a white pungent vapor.

Agaric acid is slightly soluble in cold water; when heated with 50-100 parts of water it becomes gelatinous and finally dissolves to a weakly acid solution, which possesses the characteristic property of foaming strongly when shaken. The addition of acids to hot aqueous solutions of agaric acid causes white flocculent precipitate, but a tannic acid solution (1:100) produces neither coloration nor turbidity. With alkalis agaric acid forms water soluble salts.

Agaric acid is slightly soluble in ether, chloroform, carbon-disulphide and in 180 parts 90 per cent. alcohol. It is soluble in hot acetic acid, acetic ether, oil of turpentine and in about 10 parts of alcohol.

If to a mixture of about 0.2 Gm. of agaric acid with 3 Cc. of water 2 drops of alcoholic alpha-naphthol solution (1:8) are added and then gradually 5 Cc. of concentrated sulphuric acid added, the mixture should not take on a marked blue-violet color.

If 0.10 Gm. agaric acid be boiled with 10 Cc. dilute sulphuric acid a turbid solution results, from which on standing on a water-bath oily drops separate, which crystallize on cooling.

If 0.1 Gm. agaric acid be incinerated it should leave no weighable residue.

Actions and Uses.—Agaric acid is a local irritant and in large doses produces vomiting and purging, and death through central paralysis. It paralyzes the peripheral nerves of the sweat glands, arresting the secretion of sweat. It is used to arrest colliquative sweats. The experience of most clinicians is favorable, but some report that they were unable to obtain any favorable effects. The action appears in a few hours and is not lasting. Agaric acid is one-twentieth as active as atropine and does not influence other secretions.

Dosage.—The maximal single dose of agaric acid should not exceed 0.03 Gm. ($\frac{1}{2}$ grain) and the total daily dose should not exceed 0.10 Gm. ($1\frac{1}{2}$ grains) (Pharm. Helv.) Owing to its irritant action it cannot be given hypodermically.

ALYPIN.—Alypin is 2-benzyloxy-2-dimethyl-amino-methyl-1-dimethyl-amino-butane hydrochloride, $CH_3CH_2C(C_6H_5COO)(CH_2N(CH_3)_2)CH_2N(CH_3)_2.HCl$. It is closely related to stovaine (which see).

By the action of dichloroacetone, $CH_2Cl.CO.CH_2Cl$, on ethylmagnesium bromide dissolved in ether and decomposition by water of the magnesium compound formed, ethyl-dichlorhydrin, $CH_2Cl.C-$

$(C_2H_5)_2(OH).CH_2Cl$. is obtained. From this, by the action of dimethylamine, ethyl-tetramethyl-diamino-propanol is produced. This product is treated with benzoyl chloride and the benzylethyl-tetramethyl-diamino-propanol neutralized with hydrochloric acid to form the chloride.

Alypin is a white, crystalline powder, melting at $169^\circ C.$ ($336.2^\circ F.$), hygroscopic and extremely soluble in water. Its solutions are neutral and are not rendered turbid on addition of sodium bicarbonate in moderate quantities, and may be sterilized by boiling for a period not exceeding five minutes, without decomposition. It is easily soluble in alcohol. It has a markedly bitter taste.

It should be protected from the air in well-stoppered containers. Two and four per cent. solutions are quite stable, but weaker solutions are likely to become mouldy.

Addition of potassium iodide test solution to the aqueous solution (1-100) produces a white precipitate; potassium dichromate test solution produces a yellow crystalline precipitate soluble in hydrochloric acid; potassium permanganate test solution produces a violet crystalline precipitate, which turns brown on standing. If 0.1 Gm. alypin be mixed with 1 Cc. sulphuric acid and warmed to $100^\circ C.$ ($212^\circ F.$) for five minutes and then 2 Cc. water carefully added the odor of benzoic-ethyl-ester is developed; on cooling crystals separate out, which are dissolved on adding 2 Cc. alcohol. If alypin be dried at $100^\circ C.$ ($212^\circ F.$) the loss should not exceed 1.5 per cent.

Actions and Uses.—Alypin is a local anesthetic, claimed to be equal to cocaine, but is not a mydriatic. It is said not to produce disturbance of accommodation and to be less toxic than cocaine but the evidence as to the relative toxicity of alypin and cocaine is rather conflicting.

Dosage.—Externally in the form of a 10 per cent. solution; hypodermically in 1 to 4 per cent. solutions; for the eye in 1 to 2 per cent. solution. As much as 5 Cc. of a 3 per cent. solution was well tolerated in one case.

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld Germany (Farbenfabriken of Elberfeld Co., New York). U. S. patent No. 808,748 (Jan. 2, 1906; expires 1923). U. S. trademark No. 44,808.

Alypin Tablets, $3\frac{1}{2}$ grains.—Each tablet contains 0.22 Gm. ($3\frac{1}{2}$ grains) of alypin.

Alypin Tablets, 1½ grains.—Each tablet contains 0.073 Gm. (1½ grains) of alypin.

Alypin Tablets, $\frac{1}{4}$ grain.—Each tablet contains 0.048 Gm. ($\frac{1}{4}$ grain) of alypin.

Alypin Tablets, $\frac{1}{8}$ grain.—Each tablet contains 0.022 Gm. ($\frac{1}{8}$ grain) of alypin.

AMYL VALERATE.—Amylis valeras.—Amyl valerate, $CH_3CH(CH_3).CH_2CO.O.(CH_3CH(CH_3).CH_2CH_2)$, is the isovaleric acid ester of iso-amyl alcohol.

Amyl valerate is obtained by separating (by distillation) the ester which is formed when valeric acid or solution of a valerate is added to a mixture of iso-amyl alcohol and sulphuric acid and the distillate obtained, washed, dried and redistilled.

Amyl valerate is a colorless liquid, having when dilute an odor of apples. It is insoluble in water, soluble in alcohol, ether and chloroform. It boils at $188-190^\circ C.$ ($370.4-374^\circ F.$). Its specific gravity is .858 at $15^\circ C.$

Action and Uses.—Amyl valerate has been employed in the treatment of gall-stone colic. Its employment in renal colic is not satisfactory.

Dosage.—To relieve biliary colic, from 0.2 to 0.04 Cc. (3 to 6 minims) in capsules every half hour; or 1 Cc. (15 minims) in capsules, three times daily.

ANESTHESIN.—**Æthylis Amino-Benzooas.**—**Ethyl Amino-Benzooate.**—Paramidobenzonic Acid Ethyl Ester.—Anesthesin is ethyl 4-aminobenzoate, $C_6H_4NH_2COO(C_2H_5)$, the ethyl ester of 4-aminobenzoic acid, $C_6H_4NH_2.COOH$.

Paranitrobenzoic acid is obtained by the oxidation of parani-trotoluene, and this may be ethylated by the action of sulphuric acid and alcohol and the ester so obtained reduced to paramido-benzoic acid ethyl ester by the action of zinc and hydrochloric acid, or the acid may first be reduced and subsequently converted into the ethyl ester.

It is a white, crystalline powder, easily rendered impalpable, melting at 90° to 91° C. (194° to 195.8° F.); odorless and tasteless, but producing a sensation of numbness when placed on the tongue; almost insoluble in cold water and difficultly soluble in hot water; soluble in six parts of alcohol, in ether, benzene and to the amount of 2 to 3 per cent. in fatty oils. In oil solutions it may be sterilized without decomposition, but by prolonged boiling or by warming with dilute alkalies it is split up into alcohol and paramidobenzonic acid.

It should form clear, colorless and neutral solutions in alcohol or ether; after acidification with nitric acid it should not give a precipitate with silver nitrate. Its solution in dilute hydrochloric acid (1 to 10) is not affected by hydrogen sulphide. If a few drops of sodium nitrate solution be added to the slightly acidulated aqueous solution followed by some alkaline betanaphthol solution, a cherry red coloration of bluish shade is produced, which changes to orange on further addition of hydrochloric acid. It is decomposed by prolonged heating with water and is incompatible with alkalies and their carbonates.

Actions and Uses.—Anesthesin was introduced as a substitute for cocaine and is a local anesthetic, similar in its action to orthoform, new and to propæsin (propyl aminobenzoate), and cycloform (isobutyl aminobenzoate), and said to be free from irritant action and toxicity. The anesthetic action, like that of the related compounds, resembles that of cocaine, but is purely local, does not penetrate the mucous membranes, and in consequence of its insolubility the compound cannot be used by hypodermic injection. In consequence of its insolubility the anesthetic effect is more prolonged than that of cocaine.

It is said to be useful in various forms of gastralgia, in ulcer and cancer of the stomach for the relief of pain, and is applied locally in rhinologic and laryngeal affections, urethritis, etc.; it is also employed for anesthetizing wounded surfaces, burns, ulcerations and painful affections of the skin. It is more effective in cases in which the skin is broken.

Dosage.—Internally, from 0.3 to 0.5 Gm. (5 to 8 grains). Externally, it is applied as a dusting powder, either pure or diluted. It may be applied in ointment or in the form of suppositories.

Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a.M., Germany (Farbwerke Hoechst Co., New York). German patents Nos. K 19,416 Onm.

ANTIFORMIN.—Antiformin is a strongly alkaline solution of sodium hypochlorite. In each 100 Cc. it contains approximately sodium hypochlorite equivalent to 5.68 Gm. available chlorine, sodium hydroxide 7.8 Gm., and sodium carbonate 0.32 Gm.

According to the patent specification chlorinated lime is dissolved in water at the temperature of 35° C. (95° F.). To this a solution of sodium carbonate is added. After standing the supernatant liquid is decanted and to this sodium hydroxide is added.

Antiformin is a yellowish, clear liquid having the peculiar odor characteristic of hypochlorites.

The per cent. of available chlorine, of alkali hydroxide and carbonate may be determined by the methods described in the Reports

of the Chemical Laboratory of the American Medical Association, 1910.

Actions and Uses.—Antiformin rapidly dissolves the bodies of bacteria with the exception of acid-fat organisms like the tubercle bacillus, on which it has no solvent action and which resists its germicidal action to a great extent. It dissolves other organic matters, such as those contained in sputum and feces. It exerts a strong oxidizing action and is disinfectant, antiseptic and deodorizing. It is said to be more than three times as active in germicidal action as phenol.

Based upon its property of dissolving most bacteria and the insoluble constituents of the sputum, antiformin is employed in testing for tubercle bacilli. It is said to be useful for the sterilization of the surgeon's hands, of instruments and of wounds and for general purposes of disinfection. It is also said to be useful in certain skin diseases.

Dosage.—Externally in from 2 to 10 per cent. solution. In from 4 to 1,000 solution as a spray. As a disinfectant 5 per cent. solutions are used. For the demonstration of tubercle bacilli 15 per cent. solutions are suitable.

Manufactured by the American Antiformin Co., New York. U. S. patent No. 691,671 (Jan. 21, 1902; expires 1919). A process for Cleaning Beer Vats and Pipes, said process consisting according to the patent specifications "in subjecting the walls of said vats or pipes to the action of a solution composed of about 1 part of alkaline hypochlorite with about a half to one part of alkaline hydrate, substantially as specified." U. S. trademark No. 61,693.

ANTIPYRINE SALTS.

Antipyrine, phenyldimethylpyrazolon, is a weak base which unites with acids to form unstable salts that hydrolyze readily when dissolved in water separating into their components. The therapeutic activity of these compounds represents a combination of the actions of the acid and the base.

ANTIPYRINE SALICYLATE.—Antipyrinæ Salicylas.—Antipyrine salicylate, $C_{11}H_{12}N_2O.C_6H_4OH.CO_2H$, is a weak chemical combination of antipyrine and salicylic acid.

It is prepared by heating antipyrine and salicylic acid, in molecular proportions, on the water bath, allowing the oily product to congeal by cooling and crystallizing it from alcohol.

It occurs as a white, coarsely, crystalline powder, or in hexagonal tubular crystals, melting at 91° to 92° C. (195.8° to 197.6° F.); odorless, slightly sweet; soluble in 200 parts of cold and 40 parts of boiling water; readily soluble in alcohol, less readily in ether. It is decomposed by acids with the elimination of salicylic acid, and by alkalis with the elimination of antipyrine.

Its aqueous solution is rendered milky by tannic acid, then colored green by the addition of a few drops of fuming nitric acid. It is colored deep red by ferric chloride, passing to violet red on copious dilution with water. It must not be affected by hydrogen sulphide.

It is incompatible with acids, alkalis and tannins.

If 1 Gm. of antipyrine salicylate be weighed in a separator, treated with 25 Cc. of water and 10 Cc. of sodium hydroxide test solution, and the liquid then extracted with chloroform, the latter on evaporation should yield a residue which when dry should weigh 0.57-0.58 Gm., melt at 113° C. (235.4° F.) and respond to the tests for antipyrine.

The solution remaining in the separator, acidified, and extracted with chloroform, the chloroform allowed to evaporate, should yield

a residue of white needle-like crystals, which when dry melt at 155°-156° C. (311° to 312° F.) and respond to the tests for salicylic acid.

If 0.5-1.0 Gm. antipyrine salicylate be weighed and dissolved in 50 Cc. diluted alcohol, a few drops of phenolphthalein added, the titration of this solution with tenth normal alkali should indicate the presence of not less than 32.1 per cent. salicylic acid. Each cubic centimeter of tenth normal alkali is equivalent to 0.01370 Gm. salicylic acid.

Actions and Uses.—This compound possesses the properties of both antipyrine and salicylic acid and combines the analgesic power of the one with the antirheumatic action of the other. It has been used with good results in sciatica, rheumatic fever, chronic rheumatism, influenza, pleurisy, dysmenorrhea, etc.

Dosage.—From 0.3 to 2.0 Gm. (5 to 30 grains) in cachets or capsules.

Non-Proprietary Preparations:

Antipyrine Salicylate, Farbwerke.—Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a.M., Germany (Farbwerke Hoechst Co., New York.) Not patented or trademarked.

Proprietary Preparation:

SALIPYRIN.—A name applied to antipyrin salicylate.

Manufactured by J. D. Riedel, Aktiengesellschaft, Berlin, Germany (Riedel & Co., New York). U. S. patent No. 444,004 (expired).

ANTITHYROID PREPARATIONS.

Antithyroid preparations obtained from the blood or milk of animals, after the removal of the thyroid glands.

The use of these preparations is based on the theory that the thyroid gland secretes products which are toxic, but which neutralize, and are neutralized by, other toxic substances produced elsewhere in the body. Removal of the thyroid glands would then lead to the accumulation of these second toxic substances as evidenced by the phenomena of cachexia strumipriva and myxedema. On the other hand, the blood or milk of such animals is claimed to be capable of preventing the effects of a hypersecretion of thyroid substance, such as is supposed to occur in hyperthyroidism (Basedow's or Graves' disease—generally called exophthalmic goiter).

These views are still largely hypothetical; but some clinical observers report distinctly beneficial results in the milder forms of the disease and in obscure nervous disorders which are supposedly connected with thyroid hypersecretion. The effects, if they occur at all, are less pronounced in the more severe forms. The action is probably only palliative and other measures of treatment should not be neglected.

Improvement is said to occur in two or three weeks and to be indicated by an amelioration of the nervous symptoms, tremor, palpitation, insomnia and excitability.

The administration must be long continued. Oral and hypodermic administration are said to be equally effective but the former is usually preferred. These preparations are not known to be toxic, even when very large doses are used.

THYREOIDECTIN.—**Capsulae Antithyroideae.**—Thyreoidectin consists of gelatine capsules, each containing 0.33 Gm. (5 grains) of a powder prepared from the blood of thyreoidectomized animals.

The blood is derived from sheep, goats or horses (chiefly sheep) from which the thyroid gland has been removed. The blood is rendered aseptic during the process of desiccation by the addition of chloroform, and aromatics are added to the resultant powder as a flavor.

The contents of the capsules consist of a coarse, reddish-brown powder, resembling dried blood.

Dosage.—One or two capsules three times a day, the amount being varied to suit the individual case.

Prepared by Parke, Davis & Co., Detroit, Mich.

APIOL.—*Apium Crystallisatum.*—Parsley Camphor.—Apiol, $\text{CH}_2\text{:CH.CH}_2\text{.C}_6\text{H(OCCH}_3)_2\text{:O}_2\text{.CH}_2$, is 2,5-dimethoxy-3,4-methendioxy-1²propenylbenzene, derived from 2,3,4,5-tetra-hydroxy-1propen (12) yl-benzene, $\text{C}_6\text{H(OH)}_4\text{(CH}_2\text{CH.CH}_2\text{)}$.

Apiol may be obtained by extracting the oleoresin (oleoresin of parsley seed, which see) with ether and subsequent purification. It may also be obtained by submitting parsley seed to steam distillation, cooling the volatile oil and collecting and purifying the crystals which separate.

Apiol crystallizes in long needles, having a faint odor of parsley, melting at 30° C. (86° F.) and boiling at 294° C. (561.2° F.). It is insoluble in water, but readily soluble in alcohol and ether. With strong sulphuric acid it forms a blood-red solution. Apiol is not affected by aqueous solutions of potassium or sodium hydroxide, but by alcoholic solution of potassium or sodium hydroxide it is gradually converted to isopapiol, which melts at 56° C. (132.8° F.).

Actions and Uses.—Apiol is said to produce cerebral excitation similar to that induced by coffee and in larger doses a species of intoxication, with vertigo, ringing in the ears and severe frontal headache.

Apiol has been used as an antiperiodic, but is regarded as of inferior rank for this purpose. It has also been recommended in the treatment of amenorrhea.

Dosage.—From 0.13 to 0.3 Gm. (2 to 5 grains) in capsules, as an emmenagogue; from 0.3 to 1 Gm. (5 to 15 grains) as an antipyretic.

ARBUTIN.—*Arbutinum.*—Arbutin, $\text{C}_{12}\text{H}_{16}\text{O}_7 + \frac{1}{2}\text{H}_2\text{O}$, is a glucosid occurring in the leaves of *Arctostaphylos Uva-ursi* Spr., *Vaccinium Vitis-Idaea* L. and many other genera of the family Ericaceæ.

Arbutin occurs in long, glistening, colorless needles, or as a fine white, crystalline, odorless powder having a bitter taste. It is soluble in 8 parts of water and 16 parts of alcohol; very soluble in hot water and hot alcohol; insoluble in chloroform, ether and carbon disulphide. Its aqueous solution is neutral to litmus paper and is not precipitated by solutions of the metallic salts or by solution of tannin. Its aqueous solution is colored blue by ferric chloride test solution. By boiling with diluted sulphuric acid or by treatment with emulsin, arbutin is converted into glucose and hydroquinone.

When heated to 100° C. (212° F.) arbutin loses its water of hydration. At 195° C. (383° F.) the anhydrous glucosid melts. It should leave no residue on ignition.

An aqueous solution of arbutin (1 in 20) should not be affected by hydrogen sulphide (absence of lead).

Actions and Uses.—Arbutin probably owes its effect, at least in part, to the antiseptic action of hydroquinone, formed by its decomposition in the urinary tract. It has been used as a urinary antiseptic and diuretic.

Dosage.—From 0.2 to 0.5 Gm. (3 to 7 grains) three or four times a day.

ARGYROL.—Silver Vitellin.—Argyrol is a compound of a derived proteid and silver oxide, containing from 20 to 25 per cent. of silver.

The so-called vitellin is said to be prepared by electrolytic decomposition of serum albumin. To this product, finely suspended in water, is added freshly precipitated, moist silver oxide and the mixture is heated under pressure until combination occurs. The liquid is then evaporated to dryness in vacuo. The change in the proteid is in question; probably a compound of hydrolyzed proteid (serum albumin) and silver oxide is formed.

Argyrol occurs in black, glistening, hygroscopic scales, freely soluble in water and glycerine, insoluble in oils and alcohol. The solution is yellowish or black, depending on concentration, and is not affected by boiling. Solutions of argyrol stain the skin. It gives a slight cloudiness or precipitate with sodium chloride and hydrochloric acid; on addition of ferric chloride the color is discharged with formation of a white cloud. With alkali and copper sulphate it gives a slight biuret reaction. It has a slight metallic taste. Silver is recognized in the usual way.

The compound is said to be incompatible with acids and most of the neutral and acid salts in strong solution.

Actions and Uses.—Solutions of argyrol (20 to 50 per cent.) are said to be non-irritating to mucous membranes. Taken internally it is said to be non-toxic. It is claimed to be an antiseptic. It is recommended by the manufacturers in urethritis and cystitis, in conjunctivitis and in affections of the nose, throat and ear.

Dosage.—It is employed in from 10 to 25 per cent., and even stronger solutions.

Manufactured by A. C. Barnes Co., Philadelphia. U. S. trademark.

ARSANILIC ACID AND ITS DERIVATIVES.

Arsanilic acid is derived from arsenic acid, $\text{AsO}(\text{OH})_3$, by replacing one hydroxyl by aniline (phenylamine); related compounds are made by substituting derivatives of aniline.

ARSACETIN.—Arsacetin is sodium acetyl arsanilate, $\text{C}_6\text{H}_4(\text{NH}.\text{CH}_3.\text{CO}) (\text{AsO}.\text{OH}.\text{ONa}) + 4\text{H}_2\text{O}$, a compound derived from sodium arsanilate by replacing a hydrogen atom of the amino group in sodium arsanilate, with an acetyl radical.

Arsacetin is a white crystalline substance, odorless, tasteless, and soluble to the extent of 10 per cent. in cold and 30 per cent. in hot water. It is free from arsenious or arsenic acid and solutions are not affected by boiling. It may be heated for an hour at 130°C . in the autoclave without undergoing decomposition.

If 1 part arsanilin be dissolved in 10 parts water and a few drops of silver nitrate solution added, a pure white precipitate is formed.

The salt moistened with dilute hydrochloric acid and heated on platinum wire colors the flame yellow.

If a mixture of 0.1 Gm., arsanilin, 0.5 Gm. dry sodium carbonate and 0.5 Gm. potassium nitrate be melted in a porcelain crucible, the white mass dissolved in 10 Cc. water and the solution, neutralized with dilute nitric acid, a portion of the liquid yields a white crystalline precipitate on addition of an equal volume of magnesia mixture. A further portion of the neutral liquid furnishes a brown precipitate, soluble in ammonia and also in nitric acid, on addition of a few drops of silver nitrate solution.

If 0.2 Gm. arsanilin be heated with 5 Cc. rectified spirit and 5 Cc. sulphuric acid the odor of acetic ether is developed.

The aqueous solution of arsanilin (1:10) should be clear and colorless, possess at most a faintly acid reaction and after addition of 5 Cc. dilute hydrochloric acid the liquid should not be altered by freshly prepared hydrogen sulphide solution.

If 0.1 Gm. arsanilin be dissolved in 20 Cc. water, 1 Cc. dilute

hydrochloric acid and 2 drops sodium nitrite solution added and filtered, an alkaline β -naphthol solution should produce no red coloration in the filtrate. An aqueous solution (1:20) to which 20 Cc. magnesia mixture is added should afford no turbidity or precipitate within two hours.

0.5 Gm. powdered arsacetin, after heating for 4 hours at 110° - 120° C., should show a loss in weight of about 20 per cent.

Actions and Uses.—See Sodium Arsanilate. Arsacetin is claimed to be less toxic than sodium arsanilate and to possess the advantages of keeping well and being sterilizable without decomposition. Ehrlich has advised against the use of arsacetin in syphilis.

Dosage.—For hypodermic injection from 0.1 Gm. ($1\frac{1}{2}$ grains) to 0.5 Gm. ($7\frac{1}{2}$ grains). For internal administration 0.05 Gm. ($\frac{1}{4}$ grain) three to four times daily.

Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Höchst a.M., Germany (Farbwerke Hoechst Co., New York). U. S. trademark No. 75,046.

SODIUM ARSANILATE.—**Sodii Arsanilas.**—Sodium Aniline Arsonate. Sodium Aminophenyl Arsonate. Sodium arsanilate, $C_6H_4(NH_2)(AsO.OH.ONa)$, is the sodium salt of arsanilic acid, $C_6H_4(NH_2)(AsO.(OH)_2)$, 1:4.

It is prepared to condensing aniline and arsenic acid, eliminating water and isolating the arsanilic acids. The sodium salt is prepared by the usual methods.

Sodium arsanilate occurs as white, odorless crystals soluble in (5 or 6 parts) of water and is more soluble in warm water. It has a faint salty taste. On standing the aqueous solution assumes a yellowish tint.

Sodium arsanilate crystallizes with somewhat varying amounts of water of crystallization. The arsenic content varies in different preparations from 23 to 26 per cent.

An acid solution of sodium arsanilate is not affected by hydrogen sulphide in the cold; when the solution is warmed the arsenic may be completely precipitated by hydrogen sulphide. If a solution of sodium arsanilate is treated with hydrochloric acid and potassium iodide, iodine is set free. The resulting liquid, whether freed of iodine or not, gives, even in the cold, a precipitate of arsenic sulphide when treated with hydrogen sulphide.

The arsenic and water content of sodium arsanilate may be determined by the methods given in The Journal A. M. A., September 21, 1907, p. 1041. (Reports of the Chemical Laboratory of the A. M. A., 1908, p. 13.)

An aqueous solution of the salt gives with mineral acids a white precipitate of arsanilic acid, soluble in excess of acid. An aqueous solution of the salt gives with silver nitrate solution a white precipitate of silver arsanilate. An aqueous solution of the salt, after the addition of hydrochloric acid and sodium nitrate gives a deep-red coloration with a solution of β -naphthol in caustic soda.

Actions and Uses.—The arsenic of the arsanilic acid is liberated very slowly in the system, thus producing the ordinary therapeutic effects of arsenic, with a more continuous and less toxic action and less irritation. Toxic effects from excessive doses have been frequently noted, although the toxicity of sodium arsanilate is stated to be about 1/40 of that of arsenic trioxide. The poisonous effects appear to be due largely to the arsenic component, the aniline taking no part in them. It is claimed that the use of sodium arsanilate is not followed by irritation, abscess formation, etc., which sometimes follow the use of other preparations of arsenic. The use of sodium arsanilate in large doses has occasionally been followed by degeneration of the optic nerve, leading to blindness.

Sodium arsanilate has been recommended for the conditions which are favorably influenced by arsenic, such as anemia, nervous condi-

tions and diseases of the skin. It is said to have been very successful as a remedy for trypanosomiasis, both of animals and of man, and is also said to be useful in other protozoal diseases, such as syphilis, malaria and kala-azar.

Dosage.—From 0.02 to 0.2 Gm. ($\frac{1}{2}$ to 3 grains) hypodermically every other day, gradually increasing, if necessary, until the single dose reaches 0.65 Gm. (10 grains) and until a total of 6.5 Gm. (100 grains) have been given. The drug should not be given by the mouth, as it is decomposed by the acid contents of the stomach, and toxic symptoms may result.

Proprietary Preparations:

ATOXYL.—Atoxyl is a sodium arsanilate containing about 26 per cent. of arsenic and corresponding closely to the formula $C_6H_4(NH_2)(AsO.OH.ONa) + 3 H_2O$. It is a white powder having the properties given above.

Manufactured by Vereinigte Chemische Werke Actiengesellschaft, Charlottenburg, Germany (Farbwerke Hoechst Co., New York). U. S. trademark No. 38,879.

Atoxyl Hypodermic Tablets, $\frac{1}{2}$ grain.—Each tablet contains atoxyl 0.02 Gm. ($\frac{1}{2}$ grain).

ARSENOFERRATIN.—**Sodii Arsenoferrialbuminas.**—Sodium Arsenoferrialbuminate.—Arsenoferratin is an arsenic iron albumin compound, obtained by introducing the element arsenic into the molecule of ferrialbuminic acid. Arsenoferratin contains iron in the ferric state, in organic combination equivalent to 6 per cent. metallic iron and arsenic, equivalent to 0.06 per cent. elementary arsenic.

Arsenoferratin is a brown, almost odorless and tasteless powder. It is soluble in water and easily soluble in dilute alkaline solutions.

Actions and Uses.—Arsenoferratin has the pharmacologic action of organic compounds of iron and of arsenic.

Dosage.—0.5 Gm. ($7\frac{1}{2}$ grains) three to four times daily.

Manufactured by C. F. Boehringer & Soehne, Waldhof, Mannheim, Germany. (Merck & Co., New York.) Not patented. U. S. trademark No. 24,228.

Arsenoferratin Tablets.—Each tablet contains arsenoferratin 0.25 Gm. (4 grains).

Arsenoferratos.—**Liquor Ferratini Arsenati.**—Arsenoferratos is a 5 per cent. solution of arsenoferratin.

Arsenoferratin, 5 parts, is dissolved with the aid of a small quantity of sodium hydroxide in water, 68 parts, glycerine, 20 parts, alcohol, 6 parts, and Angostura essence, 1 part.

Dosage.—From 4 to 8 Cc. (1 to 2 fluidrams) three to four times daily.

For the determination of Iron and Arsenic in Arsenoferratos, the following methods are furnished:

Twenty-five Cc. of arsenoferratos are evaporated to a viscid consistency in a capacious tared crucible and the residue heated in a drying oven at 100 degrees C., for three hours to constant weight. After the crucible and its contents have been allowed to cool in a desiccator, it is weighed. The weight of the evaporated residue multiplied by 4 should be about 23. The weighed residue is now carefully incinerated and finally ignited. After it has cooled, it is moistened with nitric acid, and again ignited, and finally taken up with 10 Cc. hydrochloric acid. The solution is diluted with 30 Cc. water, and when cold, 3 Gm. potassium iodide are added and the mixture allowed to stand for an hour in a well-stoppered bottle at the ordinary temperature. It is then titrated with deci-

normal sodium thiosulphate solution. The iodine liberated should require about 12.5 Cc. of tenth-normal sodium thiosulphate solution.

If arsenoferrate be treated as given below, and the arsenic treated with tenth-normal iodine solution, the iodine consumed should indicate the presence of not less than 0.003 Gm. arsenic per 100 Cc. arsenoferrate.

Fifty Cc. of the arsenoferrate contained in a distillation flask of about 500 Cc. capacity, are heated on a water bath and evaporated to about one-third of its original volume. To the residue are now added 80 Cc. of arsenic-free concentrated hydrochloric acid and 20 Cc. arsenic-free 25 per cent. solution of ferrous chloride, and the arsenic chloride distilled over, the receiver being kept well cooled by means of cold water. The contents of the receiver are then supersaturated with sodium bicarbonate, and the arsenic then titrated with the tenth-normal iodine solution.

ARSENPHENOL-AMINES.

NEOSALVARSAN.—Neosalvarsan is a mixture of sodium 3-diamino-4-dihydroxy-1-arsenobenzene-methanal-sulphoxylate, $\text{NH}_2\text{OH}\cdot\text{C}_6\text{H}_3\cdot\text{AS}\cdot\text{As}\cdot\text{C}_6\text{H}_3\cdot\text{OH}\cdot\text{NH}(\text{CH}_2\text{O})\text{OSNa}$, with inert inorganic salts. The arsenic content of three parts of neosalvarsan is approximately equal to that of 2 parts of salvarsan.

Neosalvarsan is prepared by precipitating a salt of 3-diamino-4-dihydroxy-1-arsenobenzene with sodium methanal-sulphoxylate and dissolving the precipitate in alkalis. From the resultant solution neosalvarsan is obtained by the addition of alcohol or acetone, or by evaporation of the solution in a vacuum.

Neosalvarsan is an orange-yellow powder possessing a peculiar odor. It is very unstable in the air. Neosalvarsan is readily soluble in water, yielding a yellow solution which is neutral toward litmus. Upon standing the aqueous solution becomes dark brown, forming a brown precipitate.

A freshly prepared aqueous solution of neosalvarsan (1 in 100) yields a precipitate on the addition of mineral acids.

If silver nitrate test solution be added to an aqueous solution of neosalvarsan (1 in 100) a brownish color should be produced, quickly followed by the formation of a black precipitate.

If ferric chloride test solution be added to an aqueous solution of neosalvarsan (1 in 100) a violet color should be produced, which soon changes to a dark red.

If to 10 Cc. of the aqueous solution of neosalvarsan (1 in 100) 5 Cc. of diluted hydrochloric acid be added and the mixture heated, the irritating odor of sulphur dioxide will be evolved. If to 10 Cc. of the aqueous solution of neosalvarsan (1 in 100) 5 Cc. of diluted hydrochloric acid be added, the precipitate collected on a filter and treated with zinc dust and warm, diluted hydrochloric acid in a test tube, and if paper moistened with a 5 per cent. cadmium chloride solution be held in the mouth of the tube, the paper should be stained yellow within a few minutes (distinction from salvarsan).

If to 10 Cc. of the aqueous solution of neosalvarsan (1 in 100) 5 Cc. of diluted hydrochloric acid be added, the precipitate removed by filtration, 2 Cc. of barium chloride test solution added to the filtrate, the mixture allowed to stand for 12 hours, the precipitate of barium sulphate removed by filtration, 5 Cc. of nitric acid added to the filtrate, the mixture boiled and evaporated to dryness, the residue should not be completely soluble in 50 Cc. of hot water slightly acidified with hydrochloric acid.

The arsenic content of neosalvarsan may be estimated according to the method described in Reports of the Chemical Laboratory of the American Medical Association, vol. iii, p. 97.

Actions and Uses.—Since neosalvarsan is merely a soluble compound of salvarsan, its actions and uses are the same as salvarsan, which see.

Dosage.—Neosalvarsan is said to be tolerated better than salvarsan, and consequently may be employed in larger doses. The average single dose for men is 0.75 Gm. (12 grains) with 0.6 Gm. (9.5 grains) and 0.9 Gm. (14 grains) as the minimum and maximum doses. For

women, 0.6 Gm. (9.5 grains) is the average, 0.45 Gm. (7 grains) and 0.75 Gm. (12 grains) as minimum and maximum. Children may be given from 0.15 Gm. (2 grains) to 0.3 Gm. (5 grains).

Neosalvarsan may be administered by intravenous or intramuscular injection, the former being considered decidedly preferable, but, owing to the danger of infiltrations, it must not be administered subcutaneously. For intravenous injections 25 Cc. of freshly distilled water should be used for each 0.15 Gm. of neosalvarsan. For the intramuscular injections 3 Cc. (45 minims) of freshly distilled water should be used for each 0.15 Gm. ($2\frac{1}{4}$ grains) of neosalvarsan, this yielding an approximately isotonic solution.

Solutions should be freshly prepared, from freshly distilled sterile cold water, or, if this is unavailable, with well boiled and cooled tap water.

Solutions of neosalvarsan must be injected immediately after their preparation. Neosalvarsan solution must not be warmed and the temperature of the injection fluid should not be more than 20 to 22 C. (68 to 71.6 F.).

Manufactured by Farbwerke vorm. Meister, Lucius & Bruening, Hoechst a.M., Germany (Farbwerke Hoechst Co., New York). German patent No. 245,756. U. S. patent applied for. U. S. trademark.

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|--------------------|--|
| Neosalvarsan, Dose | 1.—Each sealed tube contains neosalvarsan 0.15 Gm. ($2\frac{3}{10}$ grains). |
| Neosalvarsan, Dose | 2.—Each sealed tube contains neosalvarsan, 0.3 Gm. ($4\frac{6}{10}$ grains). |
| Neosalvarsan, Dose | 3.—Each sealed tube contains neosalvarsan 0.45 Gm. ($6\frac{9}{10}$ grains). |
| Neosalvarsan, Dose | 4.—Each sealed tube contains neosalvarsan 0.60 Gm. ($9\frac{3}{10}$ grains). |
| Neosalvarsan, Dose | 5.—Each sealed tube contains neosalvarsan 0.75 Gm. ($11\frac{6}{10}$ grains). |
| Neosalvarsan, Dose | 6.—Each sealed tube contains neosalvarsan 0.9 Gm. ($13\frac{9}{10}$ grains). |

SALVARSAN.—Arsenphenol-amin hydrochloride.—Arsenobenzol.—“606.”—Salvarsan is 3-diamino-4-dihydroxy-l-arsenobenzene hydrochloride, $\text{HCl.NH}_2.\text{OH.C}_6\text{H}_3.\text{As:As.C}_6\text{H}_3.\text{OH.NH}_2.\text{HCl}+2\text{H}_2\text{O}$, corresponding to 31.57 per cent. arsenic (As).

Salvarsan is prepared by the nitration of p-oxy-phenyl-arsinic acid and subsequent reduction and condensation of the resulting nitro-phenyl-arsinic acid.

Salvarsan is a yellow, crystalline, hygroscopic powder, very unstable in air. It is readily soluble in water, yielding a solution with an acid reaction. The addition of sodium hydroxide solution to an aqueous solution of salvarsan, in the ratio of two molecules of sodium hydroxide to one of salvarsan, precipitates the free base ($\text{NH}_2.\text{OH.C}_6\text{H}_3.\text{As:As.C}_6\text{H}_3.\text{OH.NH}_2$). On the addition of an aqueous solution of sodium carbonate to an aqueous solution of salvarsan, a precipitate is produced which is insoluble in an excess of the reagent.

An aqueous solution of salvarsan is not affected by the addition of dilute hydrochloric, nitric or sulphuric acids.

When salvarsan is heated with an alkaline solution of potassium permanganate the permanganate solution is reduced and ammonia given off.

The addition of ferric chloride solution to an aqueous solution of salvarsan produces a brownish-violet color, which gradually changes to a dark red; finally the liquid becomes turbid.

Silver nitrate solution added to an aqueous solution of salvarsan acidified with dilute nitric acid yields a dark yellow precipitate which rapidly becomes black.

The addition of concentrated nitric acid to an aqueous solution of salvarsan produces a yellowish-white precipitate. On further addition of the acid the precipitate redissolves and the solution becomes dark red.

The arsenic content of salvarsan may be estimated according to the method described in "Reports of the Chemical Laboratory of the American Medical Association," vol. iii, p. 97.

Actions and Uses.—Salvarsan is asserted to be useful as a specific remedy for syphilis in all stages, but not in parasymphilitic affections, such as tabes and general paralysis. It is asserted that this drug gives especially favorable results in those cases which prove rebellious to mercury and iodides. According to available data, the remedy can be employed with the prospect of cure in incipient tabes, early paralysis, and epilepsy due to syphilis, only in those cases in which its use is begun immediately after the first symptoms of the secondary disease have appeared.

It is stated that the remedy is useful in all spirillum affections, such as malaria, relapsing fever and frambesia, and it is also said to be an available substitute for arsenic in the treatment of diseases of the skin, nerves and blood.

The remedy is contra-indicated in severe disturbances of the circulatory organs, advanced degenerations of the central nervous system, fetid bronchitis, and cachexias, unless these are a direct result of syphilis; it is also contra-indicated in patients who have pronounced idiosyncrasy against arsenic. According to Leisser, Michaelis, Spletthoff and others, diabetes, nephritis and tuberculosis do not constitute contra-indications for the use of the remedy.

It should be employed with the greatest caution, if at all, in the presence of eye disease even when this is caused by syphilis.

Dosage.—From 0.3 to 0.6 Gm. (5 to 9 grains).

For children from 0.2 to 0.3 Gm. (3 to 5 grains). In infants doses of from 0.02 to 0.1 Gm. ($\frac{1}{2}$ to $1\frac{1}{2}$ grains) may be used. The dose should be varied according to the strength and condition of the patient. Salvarsan can be administered subcutaneously, intramuscularly or intravenously. For a subcutaneous and intramuscular injection a suspension in a neutral fluid is commonly employed. This suspension is prepared as follows: The weighed amount of salvarsan is triturated with 0.35 Cc. normal sodium hydroxide solution to each 0.1 Gm. of salvarsan. To this liquid a solution of 0.1 Cc. of normal sodium hydroxide solution for each 0.1 Gm. of salvarsan in 8 Cc. of sterile water is added drop by drop until the liquid is exactly neutral to litmus paper. If the neutral point is passed the excess of alkali must be carefully neutralized by a weak solution of hydrochloric or acetic acid.

Subcutaneously, salvarsan may also be administered in form of oily suspensions. These suspensions should be injected at once, using a syringe with a very thick platinum needle.

For intravenous injection a clear alkaline solution is prepared as follows: The weighed quantity of salvarsan is triturated with 0.7 Cc. normal sodium hydroxide solution for each 0.1 Gm. of salvarsan and then more of the alkaline solution is cautiously added until complete solution occurs.

This solution is diluted with from 100 to 250 Cc. (3 to 8 ounces) of sterile physiologic salt solution (0.9 per cent.) and filtered through a sterile filter.

The contents of a tube should be used at once after opening and under no circumstances should the contents of a tube damaged in transportation or any remnants of the powder from previously opened tubes be used.

Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a.M., Germany (Farbwerke Hoechst Co., New York). U. S.

patent No. 986,148 (March 7, 1911; expires 1928). U. S. trademark No. 40,734.

Salvarsan 0.6 Gm. Tubes.—Each hermetically sealed tube contains salvarsan 0.6 Gm. (9 grains).

ASPIRIN.—*Acidum Acetylsalicylicum.*—Acetylsalicylic Acid. *Acidum Acetylosalicylicum* (Pharm. Helvetica, edit. 4; Pharm. Danica, 1907; Pharm. Svecica, edit. 9; Pharm. Hungarica, edit. 3).—*Acidum Acetylsalicylicum* (Pharm. Française, 1908) Acetylsalicylic acid, $C_6H_4O(CH_3CO).COOH$, 1:2, is the acetyl derivative of salicylic acid.

It is prepared by the prolonged heating of 50 parts of salicylic acid and 75 parts of acetic anhydride at about $150^{\circ} C.$ ($302^{\circ} F.$) under a reflux condenser, and subsequent purification, by recrystallization from chloroform.

It forms small, colorless, crystalline needles, melting at $135^{\circ} C.$ ($275^{\circ} F.$), odorless and having an acidulous taste. It is soluble in 100 parts of water and freely soluble in alcohol or ether. It is readily split up on boiling with water or with alkalis with the production of acetic acid and salicylic acid or a salicylate.

It forms clear, colorless solutions, which do not develop a violet color on the addition of ferric chloride unless previously hydrolyzed by boiling with sodium hydroxide. It gives no reaction with silver nitrate, and should leave no residue when heated on platinum foil.

It is incompatible with heat, moisture, alkalis, their carbonates and bicarbonates. It keeps well when properly protected.

Actions and Uses.—Aspirin acts like salicylic acid, over which it possesses the advantage of producing less of the undesired local and systematic side effects, on account of the slow liberation of the salicylic acid. It is said to pass the stomach unchanged, the decomposition beginning in the intestine.

Dosage.—From 0.3 to 1 Gm. (5 to 15 grains) in capsules or wafers, or dissolved in sweetened water, or dry on the tongue, followed by a swallow of water. The powder should be dispensed in wax paper.

Manufactured by *Farbenfabriken vorm. Friedr. Bayer & Co.*, Elberfeld, Germany. (*Farbenfabriken of Elberfeld Co.*, New York). U. S. patent No. 644,077 (Feb. 27, 1900; expires 1917). U. S. trademark No. 32,805.

ATOPHAN AND ATOPHAN COMPOUNDS.

ATOPHAN.—Phenyl-quinolin-carboxylic-acid.—Atophan is 2-phenyl-quinolin-4-carboxylic acid, $C_6H_5N.C_8H_5COOH$. 2:4.

2-phenyl-quinolin-4-carboxylic acid was described by Doebner and Giesecke in 1887 (*Annalen der Chemie-Liebig*, Vol. 242, p. 281), who prepared it by warming together pyroracemic acid, benzaldehyde and anilin in alcoholic solution. Its therapeutic action was described by Nicolai and Dohrn in 1908 (*Deutsches Archiv für klinische Medizin*, Vol. 93, p. 331).

Atophan crystallizes in small colorless needles, melting at 208° – $209^{\circ} C.$ It is insoluble in water, but readily soluble in alkalis, hot alcohol and boiling glacial acetic acid. It has a slightly bitter taste.

Actions and Uses.—Atophan in doses of from 0.25 to 0.5 Gm. (4 to 8 grains) increases uric acid excretion within one hour. In doses of from 2 to 3 Gm. (30 to 45 grains) the normal average uric acid excretion is doubled and sometimes even trebled in twenty-four hours. This action of atophan is said to occur both under purin-containing and purin-free diet. Its influence on uric acid excretion is stronger and is exerted more promptly than that of sodium salicylate. It does not

increase the number of leukocytes, or affect the quantity of urine, or the amount of total nitrogen or of the purin bases or the phosphoric acid.

It is said to be useful in gout, particularly in the acute attacks, acting more promptly than colchicum and without undesirable by-effects. In non-uratic joint affections, particularly in acute articular rheumatism, the results reported are also said to be favorable, while the chronic forms seem to yield to atophan only in isolated cases.

Dosage.—In gout the dose is from 0.5 Gm. ($7\frac{1}{2}$ grains) four times a day to 1 Gm. (15 grains) three times a day suspended in large quantities of water. In order to prevent the precipitation of free uric acid from the urine with possibly resulting renal colic, Weintraud considers it necessary to administer simultaneously 15 Gm. (225 grains) of sodium bicarbonate in the course of the first day and from 5 to 10 Gm. (75 to 150 grains) on the following days. In articular rheumatism Heller prescribes daily doses of from 3 to 5 Gm. (45 to 75 grains).

Manufactured by the Chemische Fabrik auf Actien, vorm. E. Schering, Berlin, Germany (Schering & Glatz, New York). No U. S. patent. U. S. trademark No. 84,596.

Atophan Tablets.—Each tablet contains atophan 0.5 Gm. ($7\frac{1}{2}$ grains) and a small amount of cacao.

NOVATOPHAN.—Novatophan is ethyl 6-methyl-2-phenyl-quinolin-4-carboxylate, $\text{CH}_3\text{C}_6\text{H}_4\text{N.C}_6\text{H}_5\text{COOC}_2\text{H}_5$, 6:2:4, the ethyl ester of paratophan, (6-methyl-2-phenyl-quinolin-4-carboxylic acid):

Novatophan is a strictly yellow, odorless and tasteless, crystalline powder, melting at 76° . It is insoluble in water but readily soluble in alkalies, hot alcohol and strong acids.

If 0.1-0.2 Gm. novatophan be boiled for a short time with 0.5 Cc. sodium hydroxide solution, U. S. P., then 5 Cc. iodine test solution added and again heated, the odor of iodoform should be apparent.

If novatophan be dissolved in concentrated sulphuric acid, a light yellow solution results, which on the addition of bromine water yields a reddish yellow precipitate.

If ferric chloride be added to an alcoholic solution of novatophan a yellow, not a brown color, is produced (difference from Atophan and Paratophan).

Actions and Uses.—The same as Atophan (which see). It is practically tasteless.

Dosage.—Same as for Atophan.

Manufactured by Chemische Fabrik auf Aktien, vorm. E. Schering, Berlin, Germany (Schering & Glatz, New York). U. S. patent No. 1,045,769 (Nov. 26, 1912; expires 1929). No trademark.

Novatophan Tablets.—Each tablet contains 0.5 Gm. ($7\frac{1}{2}$ grains) novatophan.

BETA-NAPHTHOL BENZOATE.—Naphtholis Benzoas.—Benzonaphthol.—Benzoyl-Beta-Naphthol.—Beta-naphthol benzoate is beta-naphthyl benzoate, $\text{C}_6\text{H}_5\text{CO.O}(\text{C}_{10}\text{H}_7)$, the benzoic ester of beta-naphthol.

Beta-naphthol benzoate is obtained by heating beta-naphthol and benzoyl chloride together at 170°C . (338°F .), extracting the product without alcohol, and crystallizing.

It forms colorless needles or a white, crystalline powder, colorless and tasteless, melting at $107-110^\circ \text{C}$. ($224.6-230^\circ \text{F}$.). It is almost insoluble in water, but readily soluble in alcohol and in ether; also soluble in chloroform, in glycerin and in olive oil.

It is decomposed by heating with caustic alkalies into naphthol and a benzoate which will then give their characteristic reactions. To test beta-naphthol benzoate for the presence of beta-naphthol

it should be shaken several times with a dilute solution of sodium hydroxide (1:10) and immediately filtered. If beta-naphthol be present in considerable amount it will separate as a turbidity or precipitate after acidifying with dilute sulphuric acid. If the amount of beta-naphthol be small no precipitate appears, but the alkaline solution shows a bluish fluorescence and if it be boiled with chloroform a green color is produced.

A solution of beta-naphthol benzoate should not give a violet color with chloride of lime or solution of iodine and alkali.

It is incompatible with antipyrine, camphor, phenol, ferric chloride, menthol, potassium permanganate, or ethyl carbamate (urethane).

If 1 Gm. beta-naphthol benzoate be shaken with 10 Cc. water and the solution filtered, the filtrate, acidified with nitric acid, should not become turbid on addition of silver nitrate solution.

Beta-naphthol benzoate heated on a platinum foil should leave no weighable residue.

Actions and Uses.—Beta-naphthol benzoate is split up into its constituents on reaching the intestinal tract and is believed to act as an antiseptic. It is said to be diuretic. It is used internally as an intestinal antiseptic in diarrhea and typhoid fever. Externally, it is said to be useful as a parasiticide in the form of 3 to 10 per cent. ointment, and has been used in psoriasis, eczema, scabies, etc.

Note.—Wide difference of opinion exists among authorities as to the actual efficiency of any intestinal antiseptics and most urinary antiseptics. Whatever opinion regarding this is followed, it should be remembered that if used freely or for a long time any of them may have irritating effects upon the digestive tract or undesirable effects upon other tissues. Reasonable caution should therefore be exercised in using them.

Dosage.—From 0.2 to 0.5 Gm. (3 to 8 grains); maximum dose, single, 1 Gm. (15 grains), daily 4 Gm. (60 grains).

Non-Proprietary Preparations:

Beta-Naphthol Benzoate, Heyden.—Manufactured by Fabrik von Heyden, Radebuel near Dresden, Germany (Merck & Co., New York). Not patented or trademarked.

Bensonaphthol, Farbwerke.—Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a.M., Germany (Farbwerke Hoechst Co., New York). Not patented or trademarked.

BILE SALTS AND BILE SALT COMPOUNDS.

The bile of man and of several animals contain the sodium salts of conjugated cholic acids in varying proportions; in ox and human biles especially glycocholic acid, $C_{26}H_{43}O_6N$; and taurocholic acid, $C_{26}H_{45}O_7NS$. Fresh ox gall is said to contain about 3 per cent. each of sodium glycocholate and sodium taurocholate.

The sodium glycocholate and taurocholate may be separated in the following manner: Dry ox bile is treated with absolute alcohol and the tincture precipitated by ether in excess. Both salts are deposited and the glycocholate crystallises upon standing, the taurocholate remaining in amorphous form, resembling oily or resinous matter. If the deposit be dissolved in water, solution of lead acetate will throw down a lead glycocholate, while the addition of lead subacetate to the remainder will precipitate the taurocholate (U. S. Dispensary, p. 409).

Tests: All the bile acids respond to Pettenkofer's test. A small portion of the salt is dissolved in a little concentrated sulphuric acid in a small porcelain dish and warmed, care being taken that the temperature does not rise higher than 60° to 70° C. A 10 per cent. solution of cane sugar is then added, drop by drop, while the liquid is stirred with a glass rod. If compounds of cholic acid are present a beautiful red color will appear, which does not disappear

at room temperature, but usually in the course of a day becomes bluish violet. The red liquid shows in the spectrum two absorption bands, one at F and the other between D and E near to E. Care must be taken not to heat too much nor to add too much sugar. The sulphuric acid must be free from sulphurous acid and the lower oxides of nitrogen. As albumin, oleic acid, amyl alcohol, morphine, etc., may give a similar reaction, spectroscopic examination should not be omitted in doubtful cases (Hammerstein, *Lehrbuch der Physiolog. Chemie*, p. 312).

Furfurol Test (Mylius): The substance is dissolved in alcohol and for every one cubic centimeter of the alcoholic solution, one drop of a 1:1000 furfurol solution and 1 Cc. of concentrated sulphuric acid are added and the mixture cooled, if necessary, so that the temperature may not rise too high. The same color reaction occurs as in Pettenkofer's test.

Actions and Uses.—The bile salts constitute the main active principles of bile, and therefore share the actions and uses of the latter, perhaps with the advantage of more constant composition. When injected into the circulation they cause severe nervous and cardiac depression, not observed when they are given by the mouth. They are generally credited with a slight antiseptic and laxative action, with enhancing the efficiency of the resinous hydragogue cathartics, and with emulsifying and hence favoring the absorption of fat. They stimulate the secretory activity of the liver, increasing both the fluids and solids of the bile. While they are regarded as the most powerful of the so-called cholagogues, it is doubtful if even their effect is very pronounced.

They may be used in obstructive jaundice, although the rationale is somewhat doubtful; their use in biliary fistula is more reasonable, if the nutrition is noticeably affected.

Proprietary Preparations:

BILEIN.—Sodii Glyco-Taurocholas Bovis—Abbott.—Bilein is the name given to a mixture of the essential salts of the bile.

Actions and Uses.—See Bile Salts.

Manufactured by the Abbott Alkaloidal Co., Chicago. U. S. trademark No. 44,140.

Bilein Pills, $\frac{1}{4}$ grain.—Each pill contains bilein 0.015 Gm. ($\frac{1}{4}$ grain).

Bilein Pills, $\frac{1}{2}$ grain.—Each pill contains bilein 0.008 Gm. ($\frac{1}{2}$ grain).

Bilein Pills, $\frac{1}{12}$ grain.—Each pill contains bilein 0.006 Gm. ($\frac{1}{12}$ grain).

BILE SALTS-Fairchild.—Bile salts-Fairchild is a preparation obtained from fresh ox-gall, consisting essentially of sodium glycocholate and sodium taurocholate, in the proportion existing in ox bile.

Actions and Uses.—See Bile Salts.

Dosage.—From 0.13 to 0.4 Gm. (2 to 6 grains); from 4 to 5 Gm. (60 to 75 grains), per day.

Manufactured by Fairchild Bros. & Foster, New York.

Capsules of Bile Salts, Succinate of Soda and Phenolphthalein.—Each capsule contains bile salts, Fairchild 0.065 Gm. (1 grain), sodium succinate, excicated 0.20 Gm. (3 grains), and phenolphthalein 0.03 Gm. ($\frac{1}{2}$ grain).

BISMUTH BETA-NAPHTHOLATE.—Bismuth Beta-Naphtholas.—Bismuth beta-naphtholate, a bismuth salt of beta-naphthol.

Bismuth beta-naphtholate occurs in the form of a brownish or grayish powder without odor, almost tasteless and insoluble in water. It is slightly soluble in alcohol.

From 1 to 2 Gm. of bismuth beta-naphtholate is shaken in a

separator during one hour with 25 Cc. of chloroform and 25 Cc. of concentrated hydrochloric acid, and then 50 Cc. of water added and the mixture again shaken. The chloroform solution is then drawn off and the acid mixture extracted with three more portions of 10 Cc. each of chloroform and the combined extracts evaporated and dried to constant weight over sulphuric acid. A residue should remain, weighing at least 15 per cent. of the material used, which should respond to tests of identity for beta-naphthol.

If bismuth beta-naphtholate be examined by the method given below, the bismuth oxide found should weigh not less than 60 per cent. of the material taken.

The acid solution from which the naphthol has been extracted is transferred to a beaker, diluted to 200 Cc., heated to boiling, ammonia water added till turbidity appears, then sufficient hydrochloric acid to clear up the turbidity, and then 50 Cc. of 10 per cent. ammonium phosphate solution is added to the boiling liquid. The precipitate is allowed to subside, the clear liquid decanted through a tared porcelain Gooch crucible, the precipitate washed with hot water by decantation and finally transferred completely to the crucible. The precipitate and crucible are dried, placed in a nickel crucible and exposed to the full heat of a Bunsen flame till the weight is constant. The weight of the resulting bismuth phosphate multiplied by 0.6869 should yield a figure (representing bismuth, Bi) equal to not less than 60 per cent. of the material taken.

If bismuth beta-naphtholate be examined by the method given below the weight of residue should indicate not more than 1 per cent. of matter soluble in chloroform.

From 1 to 2 Gm. of bismuth beta-naphtholate is weighed to a small asbestos plugged percolating tube, 5 Cc. of chloroform added, the mixture stirred by means of a glass rod, and allowed to percolate into a tared dish. When the liquid ceases to drop, a further portion of 5 Cc. of chloroform is poured into the percolator and also allowed to percolate into the tared dish. The stem of the percolator is washed with a little chloroform, and the combined washings and percolates allowed to evaporate spontaneously and the residue brought to constant weight over sulphuric acid. The residue should not exceed 1 per cent. of the material taken.

Actions and Uses.—Bismuth beta-naphtholate is decomposed into its constituents in the intestines, where it exerts the effects of bismuth salts and of beta-naphthol. Hence it may be used in catarrhal and fermentative gastro-enteric disorders, such as gastritis, dysentery and diarrhea. (See note under Beta-naphthol Benzoate).

Dosage.—For children from 0.1 to 0.3 Gm. (1½ to 5 grains) and for adults from 1.5 to 5 Gm. (22 to 75 grains) daily.

A mixture of beta-naphtholate with acacia should be avoided as a viscid precipitate rapidly becoming hard is likely to be formed.

Non-Proprietary Preparations:

Bismuth Beta-Naphtholate, Merck.—Manufactured by E. Merck, Darmstadt, Germany (Merck & Co., New York).

Bismuth Beta-Naphtholate, Mulford.—Bismuth beta-naphtholate, Mulford, is bismuth beta-naphtholate obtained by precipitating a solution of sodium beta-naphtholate with an acetic-acid solution of bismuth nitrate, with addition of sodium hydroxide solution.

Manufactured by H. K. Mulford Co., Philadelphia. U. S. patent 985,559 (Feb. 28, 1911; expires 1928). Not trademarked.

Tablets Bismuth Beta-Naphtholate, Mulford, 5 grs.—Each tablet contains bismuth beta-naphtholate, Mulford, 0.3 Gm. (5 grains).

Orphol.—von Heyden.

Manufactured by the Chemische Fabrik von Heyden, Radebeul, near Dresden, Germany (Schering & Glatz, New York). U. S. patent expired.

Orphol Tablets.—Each tablet contains orphol, 0.3 Gm. (5 grains).

CHLORBUTANOL.—Trichlor-Tertiary-Butylalcohol. — Acetone-Chloroform.—Chlorbutanol is 1,1,1-trichlor-2-methyl-propan-2-ol, $\text{CCl}_3\text{C}(\text{OH})(\text{CH}_3)\text{CH}_3$, produced by the reaction of acetone on chloroform.

Made by the action of caustic alkalis on a mixture of chloroform and acetone. It is a white, crystalline, volatile compound having a

camphoraceous odor and taste. It is soluble in water (8-1000), in fixed and volatile oils, and glycerine; very soluble in alcohol, ether, benzine, glacial acetic acid, chloroform and acetone.

Actions and Uses.—It is said to be absorbed unchanged from the alimentary tract, but to be decomposed in the body. It is a local anesthetic with an action weaker than that of cocaine, but sufficient frequently to prevent vomiting from gastric irritation. Its antiseptic action is said to be fifteen times as strong as that of boric acid. It acts on the central nervous system similarly to chloral, and although the claim has been made that hypnotic doses are without effect on the circulation and respiration independent observers have described a fall of blood pressure and interference with respiration in animals, and consider it fully as dangerous as chloral. In man 100 grains caused severe symptoms, but recovery occurred. It is claimed that no habit is induced, but this may be because of its restricted employment. It is said to be useful as a mild local anesthetic in dentistry, etc., as a preservative for hypodermic solutions; for insomnia, vomiting, and for spasmodic conditions. It is also said to be useful as an introductory to general anesthesia, as it lessens excitement and nausea.

Dosage.—From 0.3 to 1.5 Gm. (5 to 20 grains) dry or in capsules. Hypodermically as a local anesthetic a saturated aqueous solution may be used.

Proprietary Preparations:

CHLORETONE.—A name applied to chlorbutanol by Parke, Davis & Co., Detroit, Mich. U. S. Trademark.

Chloretone Inhalant.—Chloretone (chlorbutanol), 1 Gm.; camphor, 2.5 Gm.; menthol, 2.5 Gm.; oil of cinnamon, 0.5 Gm.; refined liquid petroleum, 93.5 Gm.

Actions and Uses.—An anodyne, antiseptic and emollient solution for use by inhalation as a very fine spray or nebula.

COLLARGOL.—Collargolum.—Colloidal Silver.—Argentum Colloidale—Argentum Credé.—Collargol is an allotropic form of metallic silver, said to contain 85-87 per cent. of silver, and a small percentage of albumin with products of its oxidation. It forms with water a fairly stable colloidal suspension.

Collargol occurs as small, hard, brittle, bluish-black, scale-like pieces. With 20 parts of distilled water it forms a dark-olive-brown colloidal suspension which remains stable for months. (In these suspensions colloidal bodies are in such extreme state of subdivision that they were formerly supposed to be in solution. No separate silver particles can be distinguished in the suspension, even when magnified to the highest degree under the microscope. The addition of albumin to collargol prevents or delays its precipitation by acids and salts. A sufficient amount of albumin to prevent its precipitation under ordinary conditions is therefore added to collargol during its manufacture. Hence collargol, even when added to spring or well water containing salts, undergoes no change, and it remains unaffected by boiling, whereas colloidal silver, containing no albumin, precipitates on being boiled.

A colloidal suspension of collargol does not respond directly to the usual tests for silver. If the colloidal suspension is warmed with nitric acid a white cloudiness is produced, which clears completely on standing and the silver can then be demonstrated in the usual manner. On heating a fragment of collargol on a platinum scoop, shining white metallic silver of the ordinary kind, insoluble in water, is at once formed.

Its colloidal suspension should not be exposed to light or air; it is incompatible with the usual silver reagents.

Actions and Uses.—Collargol is claimed to be a systemic antiseptic and germicide.

Dosage.—In most cases it is best employed locally in the form of a 15 per cent. ointment (see collargol ointment) from 2 to 4 Gm. (30 to 60 grains) being very thoroughly rubbed into the skin; otherwise, in carefully filtered solutions (colloidal suspensions) varying in strength according to the intended use; from 2 per cent. to 5 per cent. for intravenous injections, 1/50 per cent. to 1 per cent. solutions (colloidal suspensions) for washes; 5 per cent. dusting powder, prepared with finest clay; in the form of bougies containing 0.2 Gm. (3 grains), and vaginal suppositories and tampons each containing 0.05 Gm. ($\frac{1}{4}$ grain), for parenchymatous injections in 0.5 per cent. to 1 per cent. glycerine solutions. Internally a solution (colloidal suspensions) of 1:500 to 1:100 is given freely in teaspoonful doses added to the food, in infectious gastric and intestinal diseases. It is also given in tablets containing 0.06 Gm. (1 grain).

Manufactured by the Heyden Chemical Works, Radebeul, Germany, and Garfield, N. J. (Schering & Glatz, New York). U. S. trademark No. 32,452.

Collargol Ointment.—Unguentum Credé.—Ointment of Colloidal Silver.—Collargol ointment is an ointment containing 15 per cent. of collargol.

It is prepared by incorporating 15 parts of collargol with 5 parts of water, 10 parts of white wax, and 70 parts of benzoated lard, taking care that the soluble silver shall not be transformed into metallic silver of the ordinary kind. This, it is asserted, it is prone to do unless great care is observed in the manipulation.

The natural color of collargol ointment is dark bluish-gray. The addition of water may impart to the ointment a brownish shade; this does not, however, in any way impair its efficiency. The ointment is good as long as it colors the skin black.

CREOSOTE CARBONATE.—Creosote carbonate is a mixture of carbonic acid esters, analogous to gualacol carbonate, prepared from creosote.

It is prepared by passing a current of carbonyl chloride into a solution of creosote in sodium hydroxide and purifying the oily product by washing with weak soda solution and with water.

It is a yellowish, thick, honey-like, perfectly clear and transparent liquid, containing 92 per cent. of creosote. It is odorless and has a bland oily taste. It is insoluble in water but soluble in alcohol, ether, chloroform, benzene and in fixed oils.

The addition of a few drops of ferric chloride solution to the alcoholic solution should not cause any change in color. On boiling with potassium hydroxide solution the odor of creosote is evolved.

It is incompatible with alkalis.

Actions and Uses.—Creosote carbonate has the same action as creosote, but is claimed to be non-toxic and devoid of irritant properties. It is recommended as a substitute for creosote for internal exhibition in tuberculosis, pneumonia, and as an intestinal antiseptic.

Note.—The Council would note that any claims of non-toxicity that are made for drugs that have or are supposed to have important general effects are admitted to this book only when they do not conflict with known facts. In all such instances, however, it is recommended that a claim of lack of toxicity be not accepted too freely but be considered to mean only that toxic effects have not as yet been recognized with the doses that have been studied. The most sincere and apparently justified beliefs concerning this point are often ultimately

reversed by extended experience. Much the same may be said regarding any claims that drugs are non-irritating.

Dosage.—From 0.3 to 2.0 Gm. (5 to 30 grains) for children, to from 1 to 4 Gm. (15 to 60 grains) for adults in milk, coffee, wine, cod-liver oil or emulsion. Externally it may be applied undiluted.

Proprietary Preparations:

CREOSOTAL.—A name applied to Creosote Carbonate.

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Fabriken of Elberfeld Co., New York). U. S. patent No. 501,235 (expired); U. S. trademark.

DIGITALIS PREPARATIONS.

The chemistry of Digitalis is very imperfectly understood, but several principles have been isolated in a greater or less degree of purity. These include digitalin, digitalein, digitoxin, digitonin and digitin. The term diggitalin, unfortunately, is applied in a loose way to all of these principles, and in a more restricted sense to indicate digitalinum verum, or true digitalin, which is probably a definite substance.

Digitalinum purum, or German digitalin, is a mixture of several glucosides, consisting of 50 to 60 per cent. of digitonin and only 5 to 6 per cent. of true digitalin. German digitalin is the preparation usually found on the market and is ordinarily dispensed when "digitalin" is prescribed.

French digitalin, or Homolle's digitalin, is also a mixture of several glucosides, but consists mainly of true digitalin.

Merck's crystallized digitalin is neither digitalin nor digitoxin, but digitonin or digitin, Merck using the three terms, crystallized digitin, digitonin and digitin as synonyms.

Digitaline cristallisée of Nativelle is not digitalin, but is nearly identical with digitoxin.

It must be remembered, therefore, that Merck's "crystallized" digitalin, Merck's "pure" digitalin and the "true" digitalin of Boehringer and Sons, which naturally might be supposed to be identical, are different in their action.

DIGALEN.—Liquor Digitoxini Solubilis.—Digalen is a mixture said to contain 1 part of digitoxin soluble Cloetta¹ in 1,000 parts of glycerin and 1,600 parts of distilled water with 7.5 per cent. of alcohol. 1 Cc. is said to contain 0.0003 Gm. of digitoxinum soluble Cloetta.

Digitoxin soluble Cloetta is manufactured as follows:

The dried and finely powdered leaves of digitalis are extracted with dilute alcohol; then the extract is mixed with lead acetate solution in order to remove chlorophyll and resins, and filtered. From this filtrate the excess of lead is precipitated with sodium sulphate and the alcohol distilled off in vacuo. From the remaining aqueous solution the substance is extracted by ethereal solvents and precipitated afterward in an amorphous and pure condition according to a special secret method.

Digitoxin soluble Cloetta is described as an amorphous, aromatic smell and a sweet taste which turns bitter afterward.

Digitoxinum soluble Cloetta is described as an amorphous, white or slightly yellow powder. Its solubility is said to be about five times as great as that of crystallized digitoxin. It is said to dis-

¹The Council has not determined whether digalen contains "soluble amorphous digitoxin" or not, but accepts it simply as a soluble digitalis preparation.

solve very readily in alcohol and chloroform and a little less readily in ether. It has an intensely bitter taste and causes violent sneezing. It is claimed to be the form in which digitoxin exists in the digitalis leaf before it is deposited in a crystalline and insoluble form.

In order to test the active principles in digalen, a few drops of dilute acetic acid are added to 2 Cc. of digalen solution and then the mixture is shaken out with chloroform. This solution is evaporated and the residue dissolved in about 2 Cc. of glacial acetic acid containing traces of iron chloride. If to this solution concentrated sulphuric acid is added cautiously without mixing, so as to form a separate layer at the bottom of the test tube, a small brown ring will form between the two layers, which becomes broader in the course of some hours and expands toward the top of the tube in a blue-green to black shade, and toward the bottom of it in a reddish-brown one, while the acetic acid acquires finally a dark green-blue color.

Actions and Uses.—The same as Digitoxin, which see.

Note.—Under certain conditions which have not yet been determined satisfactorily, digalen sometimes deteriorates, even when the bottle remains unopened.

Dosage.—Average single dose 1 Cc. (16 min.). Maximum single dose 2 Cc. (32 min.). Maximum daily dose 6 Cc. (96 min.). Intravenous injections of 1 Cc. (16 min.) may be repeated at intervals of one-half to one hour as necessary. For protracted dosage from 1 to 2 doses daily of from 7 to 14 drops are given.

Manufactured by F. Hoffmann-LaRoche & Co., Basel, Switzerland (The Hoffmann-LaRoche Chemical Works, New York). U. S. trademark Nos. 43,693 and 83,738.

Digalen Tablets.—Each tablet is said to contain digitoxin amorphous Cloetta equivalent to digalen 0.5 Cc. (8 minims.).

Prepared by F. Hoffmann-LaRoche & Co., Basel, Switzerland (The Hoffmann-LaRoche Chemical Works, New York).

DIGIPURATUM.—Digipuratum is a digitalis preparation said to contain digitoxin and digitalin in the form of tannates. It is standardized biologically by the method of Gottlieb. It is claimed that 85 per cent. of the inactive substances found in the ordinary extract have been removed and that it is free from digitonin.

Digipuratum is obtained by removing objectionable constituents from an alcoholic extract of digitalis, neutralized with alkaline hydroxides, by the addition of ether, petroleum benzene, or other suitable precipitant, and reducing the purified liquid to a powder, by evaporation with milk sugar.

Digipuratum is a greenish-yellow, odorless powder of bitter taste. The active constituents of digipuratum are insoluble in cold water and diluted acids, but are easily soluble in weak alkalies.

Digipuratum responds to the following identity test: If 0.1 Gm. digipuratum is underlaid with about 3 Cc. of glacial acetic acid which contains 1 per cent. of a 5 per cent. solution of ferric sulphate, there appears a red band (presence of digitalin) and above this another, at first bright green, later changing to dark green and finally blue (presence of digitoxin).

To determine the digitoxin content, 10 Gm. of digipuratum are dissolved with moderate heat in 50 Cc. of water; 5 Cc. or 10 per cent. ammonia water are added and the liquid is then extracted with chloroform. The chloroformic extractions are filtered into a tared vessel and the chloroform removed by distillation. The residue is dissolved in 3 Gm. of chloroform and mixed with 7 Gm. of ether and 50 Gm. of petroleum ether. The separated flakes are collected on a small filter. Then the residue on the filter is dissolved in absolute alcohol, allowing the solution to run into the tared distilling vessel. The alcohol is then distilled off and the residue dried to constant weight. The digitoxin thus found should not amount to more than 0.04 Gm.

The physiologic activity is determined by the method of Gottlieb: 1 Gm. of digipuratum is treated with 19 Cc. of hot water and 1 Cc.

of a 2 per cent. solution of sodium bicarbonate. If now 0.15 Cc., 0.2 Cc. and 0.25 Cc., respectively, of this solution is injected into the femoral lymphatics of freshly caught land frogs (*Rana temporaria*), weighing 30 Gm. each, the exposed heart of the animals should permanently be brought to a stop in the majority of instances (say in five out of six experiments) within half an hour after the administration of a 0.2 Cc. dose. If 0.2 Cc. of the 5 per cent. solution=0.01 Gm. of digipuratum is sufficient to stop the systolic heart-beat within half an hour, then 1 Gm. of digipuratum will contain 100 units; should 0.25 Cc. of the 5 per cent. solution be necessary, the number of units of digipuratum it contains would be 80; if 0.25 Cc. should not yet prove sufficient, the preparation would be too weak to be effective; and should the systole be arrested after a dose of 0.15 Cc. within half an hour after injection, the preparation would be too strong.

The total physiologic activity having been determined, the relative amount that is due to digitoxin can be determined by using the digitoxin separated in the above quantitative determination and by the difference between this amount and the total physiologic activity the amount due to the digitalin alone can be estimated.

Actions and Uses.—The same as digitalis, but it is claimed that it is less liable to disturb the stomach and on account of its exact dosage cumulative effects can be more easily avoided than with other preparations of digitalis.

Dosage.—The same as digitalis.

Manufactured by Knoll & Co., Ludwigshafen a. Rh., Germany, and New York. U. S. patent No. 943,578 (Dec. 14, 1909; expires 1926). U. S. trademark No. 73,012.

Digipuratum Tablets 1½ grains.—Each tablet is said to contain digipuratum 0.1 Gm. (1½ grains).

DIGIPURATUM AMPOULES.—This dosage form of an accepted proprietary article has been accepted.

Each ampoule contains 1 Cc. of a digipuratum solution, faintly alkaline and isotonic with the body fluids, equivalent to .1 gram (1½ grains) digipuratum.

DIGIPURATUM SOLUTION FOR ORAL USE.—This dosage form of an accepted proprietary article has been accepted.

Vials containing 10 Cc. digipuratum solution, each Cc. representing .1 gram (1½ grains) of digipuratum. The solution for oral use must not be given hypodermically.

DIGITALEIN, CRUDE.—*Digitalinum Crudum.*—Digitalein crude is a mixture of glucosides from digitalis purpurea prepared according to the process of Schmiedeberg, containing digitoxin, digitalin and digitalein.

Commercial digitalein is an amorphous, yellowish-white, bitter powder, soluble in water and absolute alcohol, insoluble in chloroform and ether. The aqueous solution foams on shaking. The solution yields a precipitate on addition of lead acetate, ammonia water or tannic acid.

Actions and Uses.—Digitalein acts on the heart like digitalis. It is a diuretic.

Its uses are the same as those of digitalis.

Dosage.—From 0.001 to 0.002 Gm. (1/60 to 1/30 grain) two or three times a day.

DIGITALIN, TRUE.—*Digitalinum Verum Kiliani.*—Schmiedeberg's digitalin. Digitalin, true, is a glucoside, $C_{35}H_{56}O_{14}$, found in the seeds and leaves of digitalis purpurea and derived commercially from German digitalin.

To a solution of one part German digitalin in four parts of 95 per cent. alcohol, five parts of ether by weight (Sp. Gr. 0.720) are added and the mixture allowed to stand in a closed vessel for twenty-four hours. In the clear supernatant solution the quantity of dissolved substance is estimated and the whole then subjected to a vacuum distillation until its weight becomes .16 times that of the total dissolved substance. To this concentrated solution water, in an amount 2.4 times the weight of dissolved substance, is added, forming a solution containing approximately 20 per cent. alcohol, from which crude digitalin gradually separates on standing. The crude product is washed first with 10 per cent. alcohol and then with water, and finally dried at a moderate temperature. Further purification is effected by boiling the alcoholic solution with animal charcoal. (Killiani's method, Hager's Handb. der Pharm. Praxis, Vol. 1, p. 1030.)

Digitalin occurs as a white amorphous powder, or in characteristic, granular masses. It melts at 217° C. (412.6° F.) and becomes yellow. It is soluble in 1,000 parts of water and in 100 parts of 50 per cent. alcohol, but nearly insoluble in ether and chloroform. Digitalin dissolved in alcohol and treated with very dilute acid and heat yields digitaligenin and two sugars.

With concentrated sulphuric acid digitalin forms a golden yellow solution which on the addition of potassium hypobromite solution changes to a magnificent rose red or violet red.

If a little digitalin is dissolved in 3 to 4 Cc. of glacial acetic acid to which a trace of ferric chloride solution has been added and the mixture carefully underlaid with concentrated sulphuric acid (Keller's reaction) a deep carmine-red band appears; the lower layer of the acetic acid is light yellow, changing to brownish. (Difference from digitoxin.)

Sulphuric acid containing a little ferric sulphate gives with a little digitalin at first an intense golden yellow color, and then a red solution; this color rapidly changes to a beautiful and permanent violet. If too much digitalin is used the red color remains and only the surface layer becomes violet.

On heating on platinum foil digitalin should burn without leaving a weighable residue.

If a granule of digitalin is covered with 2 Cc. of 10 per cent. potassium hydroxide solution no color should develop within one minute (absence of other glucosides).

If digitalin is stirred to a thin paste with water and for every 100 parts of water used 22 parts of amyl alcohol is added with shaking, and the mixture set aside in a closed vessel for 24 hours, the presence of digitonin will be indicated by the formation of distinct masses of crystals.

Actions and Uses.—The same as those of digitalis. Its cumulative action is probably not so great as that of digitoxin.

Dosage.—It is impossible at present to state the correct dose for digitalinum verum Killiani. Some authorities give the same dose as that for digitoxin, whereas others give it as much larger. It is best given in pills made by trituration with sugar of milk and massing with glucose. Solutions of digitalin rapidly lose their strength and should be freshly prepared.

DIGITALIN, "FRENCH."—Homolle's Digitalin. Digitaline Amorphe. Digitaline Chloroformique. Digitalin, French, is a mixture, obtained from digitalis purpurea by the method of Homolle, consisting mainly of digitalinum verum Killiani.

One hundred Gm. powdered digitalis leaves are moistened with one liter of water and slowly exhausted in a percolator until the percolate amounts to three liters. This is precipitated with 250 parts of lead acetate and the filtrate from the precipitate treated with 40 parts of crystallized sodium carbonate and 20 parts of sodium ammonium phosphate, in order to remove the excess of lead. The filtrate is precipitated with 40 parts of tannic acid. The tannate is mixed with 25 parts of powdered litharge and 50 parts of purified animal charcoal and dried. From the dried mass the digitalis bodies are extracted with 90 per cent. alcohol, the latter is distilled off and the residue washed with distilled water and

again taken up in 90 per cent. alcohol. This is again distilled and the residue exhausted with chloroform. On expelling the latter the digitalin remains behind (Hager's Pharm. Praxis, Vol. I, p. 1935).

French digitalin is a yellowish-white, amorphous powder of a peculiar aromatic odor and little taste. It is neutral to litmus, almost insoluble in water, soluble in alcohol and chloroform and insoluble in ether. It softens at 90° C. and begins to melt at 100° C. It is not precipitated by solutions of lead salts, but with tannic acid it forms a tannate insoluble in water. It is colored emerald green by concentrated sulphuric acid.

Concentrated sulphuric acid dissolves digitalin French, producing a yellow color, which finally goes over to an emerald-green color.

Action and Uses.—Action like that of digitoxin. Uses the same as those of digitalis.

Dosage.—What has been said with regard to the dose of digitalinum verum applies to the French digitalin; the dose is variously given as from 0.00025 to 0.002 Gm. (1/250 to 1/35 grain). Maximum daily dose 0.006 Gm. (1/10 grain). It must be used with caution and its action carefully watched.

DIGITALIN, GERMAN.—Digitalinum Germanicum.—Digitalin, German, is a mixture of glucosides obtained from digitalis seeds according to the process of Walz, and consisting largely of digitonin, with digitalin verum and other glucosides.

Note.—Digitonin is given as a synonym for crystallized digitalin by some manufacturers and it is to be observed particularly that this is quite different from "true digitalin" or the "crystalline digitaline" of the French Pharmacopœia.

Digitalis seeds are extracted with alcohol, the alcohol driven off, the extract diluted with water and purified by precipitation with lead acetate. The filtrate is freed from lead by sodium phosphate. From the liquid thus purified the digitalis bodies are precipitated with tannic acid, the tannate well washed with water and decomposed with lead or zinc acetate. The digitalin thus separated is taken up in alcohol, the latter carefully distilled off and the residue washed with ether as long as it takes up anything. The digitalin purified in this way is dried at a low temperature and finally powdered. (Hager's Handbuch der Pharm. Praxis, 1903, Vol. I, p. 1032).

German digitalin is a yellowish-white, amorphous powder, soluble in water and alcohol, insoluble in ether and chloroform. It is said to contain about 50-60 per cent. of digitonin and 5-6 per cent. of digitalinum verum, the remainder being digitalein and other glucosides.

Sulphuric acid, containing a trace of ferric sulphate produces with digitalin, German, an intense golden-yellow coloration, changing to red and finally to a permanent reddish-violet.

Actions and Uses.—Similar to those of digitalis.

Dosage.—From 0.001 to 0.002 Gm. (1/60 to 1/30 grain). Maximum dose 0.004 Gm. (1/16 grain); maximum per day, 0.02 Gm. (½ grain). Doses from 1/10 to ½ grain, and even higher, have been used by some clinicians.

As German digitalin (so-called digitalinum purum) is a mixture of very powerful active principles, the proportion of which may vary with changes in the manipulations, it is very important that the directions for its preparation should be very carefully followed, and caution should be exercised to purchase only such products as the manufacturers can guarantee to have been made with the necessary care.

DIGITOL.—Fat-Free Tincture of Digitalis, Mulford.—Digitol is a biologically and chemically standardized, fat-free tincture of digitalis, corresponding in drug strength to tincture of digitalis, U. S. P., and containing not more than 70 per cent. alcohol.

Digitalis which has previously been subjected to percolation with petrolatum benzin is extracted by percolation with the hydro-alcoholic menstruum in the usual way.

It is a brownish-green liquid, having a characteristic and highly alcoholic odor and a bitter taste.

It is standardized to contain not less than 0.025 Gm. digitoxin in 100 Cc., and to such a strength that the minimum lethal dose for a 250 Gm. guinea-pig is approximately 1 Cc. Digitoxin may be determined by the method of prescribed by Reed and Vanderkleed (*American Journal of Pharmacy*, March, 1906). The minimum lethal dose on normal (250 Gm.) guinea-pigs is also determined and the preparation adjusted so that 1 Cc. is the minimum lethal dose.

Actions and Uses.—The same as *Digitalis*.

Dosage.—0.3 to 1 Cc. (5 to 15 minims). On account of the deterioration liable to occur in this preparation, the date when it was tested appears on each package.

Manufactured by H. K. Mulford Co., Philadelphia. No U. S. patent or trademark.

DIGITOXIN.—*Digitoxinum.*—*Digitoxinum* (Pharm. Helvetica, edit. 4). *Digitaline Crystallisée* (Pharm. Française, 1908). *Digitoxin*, $C_{34}H_{48}O_{11}$, is the chief active principle of *digitalis*, having the character of a glucoside.

The leaves of *digitalis purpurea*, having been extracted with water and dried, are extracted with 50 per cent. alcohol. This solution is treated with lead acetate, forming a precipitate which is allowed to settle. The supernatant liquid is decanted. The remaining alcohol is evaporated in vacuo and the residue repeatedly extracted with ether. The ether extract is then shaken out with water and concentrated by distillation, and the residue recrystallized from hot alcohol (85 per cent.) and decolorized by boiling with animal-charcoal (*Schmidt's Pharm. Chemie*, edit. 3, Vol. II, p. 1640).

Depending on the solvent from which it is crystallized, it is either hydrated or anhydrous. The hydrated form is obtained when crystallized from alcohol and the anhydrous from chloroform and alcohol mixture, forming colorless rectangular leaflets melting at 243° C. (470° F.) (Pharm. Française, 1908). The anhydrous preparation is official in the Pharm. Française, 1908.

It is insoluble in water, benzin or carbon disulphide, slightly soluble in ether and easily soluble in chloroform. At 15° C. it is soluble in 79.80 parts of absolute alcohol and in 43.04 parts of 90 per cent. alcohol. It is slightly soluble in fatty oils (Pharm. Française, 1908).

Digitoxin dissolved in 2 Cc. glacial acetic acid containing trace of ferric chloride when poured onto 2 Cc. of concentrated sulphuric acid containing a trace of ferric chloride, will produce a brown color at the zone of contact of the two solutions. This color gradually changes to green and finally an indigo blue; after one-half hour the entire acetic-acid layer will become blue (Pharm. Française, 1908).

It dissolves to a colorless solution in cold concentrated hydrochloric acid, but when this solution is heated on the water bath for some time a green color is obtained. Concentrated sulphuric acid dissolves it, producing a green color.

It should not lose weight appreciably when heated to 100° C. It should be insoluble in water and in benzin, but completely soluble in chloroform. It should leave no residue when ignited (Pharm. Française, 1908).

Actions and Uses.—Digitoxin acts much like *digitalis*. Its activity varies with the method of preparation. Digitoxin from an unknown source should be tested on animals before it is used on patients. Owing to its slow excretion, it is cumulative in action when too frequently repeated. Locally it is very irritant, and when given by mouth is liable to derange the digestion. Penzoldt claims that gastric irritation may be avoided by giving the drug only when the stomach is

full. Owing to its irritant action, it is not suitable for hypodermic injection.

Dosage.—Single dose 0.00025 Gm. (1/250 grain); maximum daily dose, 0.0010 Gm. (1/67 grain). It should be given largely diluted and repeated cautiously.

Antidotes: Emetics, tannin, nitroglycerin, morphin, alcoholic stimulants or camphor.

DIPLOSAL.—*Acidum Salicylo-Salicylicum.*—*Salicylsalicylate.*—Diplosal is the salicylic ester of salicylic acid, $\text{OH.C}_6\text{H}_4\text{COO.C}_6\text{H}_4\text{COOH}$.

Diplosal is obtained from salicylic acid or salicylates by the action of suitable condensing agents.

Diplosal occurs as a white, crystalline powder, practically free from odor and taste. It melts at 147-148 C. It is almost insoluble in water, but is easily soluble in ether and in benzene. It is soluble in alkaline solutions, with formation of alkali salicylate.

When diplosal is shaken with water and filtered, the filtrate is not colored violet-red by ferric chloride solution, nor should it be rendered turbid by silver nitrate solution.

If 0.05 Gm. of diplosal be boiled with 1 Cc. of normal potassium hydroxide solution, then 1 Cc. of normal sulphuric acid added and diluted with 5 Cc. of water, the addition of ferric chloride solution will give rise to a violet coloration.

When incinerated Diplosal should leave no weighable residue.

Actions and Uses.—As diplosal is almost insoluble in water and in dilute acids, whereas it is readily soluble in dilute alkaline solutions with the gradual splitting up into salicylic acid, it passes through the stomach undecomposed, but is readily absorbed in the intestines. Salicylic acid can be detected in the urine very soon after the ingestion of diplosal, and the salicylic acid can be detected even after about 42 hours.

Diplosal is indicated in all diseases in which salicylic acid or its derivatives are ordinarily given, and particularly in articular and muscular rheumatism, neuralgia, sciatica, migraine, influenza, etc., and also in cystitis, pleurisy, etc.

Diplosal differs from other salicyl derivatives in that it contains only salicylic acid. Whereas the other derivatives of salicylic acid heretofore employed medicinally contain only 53 to 77 per cent. of this acid, 100 parts of diplosal, when hydrolyzed in the intestinal tract, yield 107 parts of salicylic acid.

Dosage.—Single dose, $\frac{1}{2}$ to 1 gm. (7½-15 grains); daily dose up to 6 Gm. (90 grains). Diplosal is marketed in the form of powder and tablets.

Manufactured by C. F. Boehringer and Soehne, Waldhof, Mannheim, Germany (Merck and Co., New York), U. S. patent No. 922,995 (May 26, 1909; expires 1926). U. S. trademark No. 85,649.

Diplosal Tablets, 7½ grains.—Each tablet contains diplosal 0.5 Gm. (7½ grains).

ELECTR-HG.—*Electromercurol.*—*Electr-Hg* is a colloidal suspension of mercury equivalent to 0.1 per cent. metallic mercury (Hg) and containing a small percentage of sodium arabate.

Electr-Hg is prepared by passing an electric current in the form of an arc between two mercury electrodes in distilled water. It is made stable by the addition of sodium arabate, which is prepared by acting on acacia (gum arabic) with hydrochloric acid precipitating the resulting arabic acid with alcohol and neutralizing the arabic acid with sodium carbonate.

Electr-Hg is an odorless, tasteless liquid appearing transparent

and brown in color by transmitted light and opaque and gray by reflected light. The addition of potassium cyanide solution or of strong nitric acid yields clear, colorless solutions. The nitric acid solution responds to tests for mercury.

Actions and Uses.—Electr-Hg is claimed to have an action similar to that of the soluble salts of mercury. Locally it is said to produce no pain when given by intramuscular injection, and to leave no induration.

Dosage.—It is injected intramuscularly and intravenously in doses of 5 Cc. per day. For the intraspinal injection the dose is from 1 to 2 Cc., injected once a month or less frequently according to the effects it produces.

Electr-Hg is marketed in ampules only, in a non-isotonized condition. The package contains a physiologic salt solution with directions for the extemporaneous isotonicization of the preparation before the injection.

Manufactured by Comar & Cie., Paris, France. No. U. S. patent or trademark.

Ampoules Electr-Hg, 5 Cc.—Each ampoule contains electr-Hg 5 Cc. (75 minims).

EMETINE HYDROCHLORIDE.—*Emetinæ Hydrochloridum.*—Emetine hydrochloride is the hydrochloride, $C_{30}H_{44}N_2O_4 \cdot 2HCl \cdot 2H_2O$, of an alkaloid found in *Cephaelis ipecacuanha*.

Emetine hydrochloride occurs as a white crystalline powder, soluble in water and alcohol. The aqueous solution of emetine hydrochloride is practically neutral toward litmus. The general alkaloidal reagents precipitate emetine, even from dilute solutions. Alkalies precipitate emetine from aqueous solutions of its salts. A freshly prepared concentrated solution of ammonium molybdate in concentrated sulphuric acid (Froehde's reagent) is colored green by emetine hydrochloride.

If 0.10 Gm. of emetine hydrochloride be dissolved in 5 Cc. of water, the solution made distinctly alkaline with potassium hydroxide, shaken with ether till the residue obtained by evaporating 1 Cc. of the ether extract taken up in a few drops of acidulated water no longer yields a turbidity with iodine test solution, then acidified and made alkaline with ammonia water and again extracted with ether, the second ether extraction on evaporation should leave a residue which, when treated with Froehde's reagent, should not become purple.

If emetine hydrochloride be dried to constant weight at 100° , the loss in weight should not exceed 8 per cent. of the original substance.

If 0.5 Gm. emetine hydrochloride be incinerated no weighable ash should remain.

Actions and Uses.—Emetine acts similarly to Ipecac but is relatively more nauseant and less emetic, and causes relatively less renal irritation, but more cardiac depression. Emetine hydrochloride in the form of injections has been reported to be of especial value in amebic dysentery.

Dosage.—Expectorant, from 0.005 to 0.01 Gm. ($1/12$ to $1/6$ grain). From 0.01 to 0.02 Gm. ($1/4$ to $1/2$ grain) causes emesis, but cephaeline is preferred as an emetic. By hypodermic injection, 0.03 Gm. ($1/2$ grain).

Non-Proprietary Preparations:

Emetine Hydrochloride, Merck.—Manufactured by E. Merck, Darmstadt, Germany (Merck and Co., New York).

Ampuls Emetine Hydrochloride, Mulford.—Each ampoule contains emetine hydrochloride 30 mg. ($1/2$ grain). Prepared by the H. K. Mulford Co., Philadelphia.

EPINEPHRINE PREPARATIONS.

EPINEPHRINE.—Epinephrine is 1, 2-dihydroxy-42-methylamino ethyl-41-ol benzene, $C_6H_5(OH)_2(CHOH.CH_2NHCH_3)$, a substance with feeble basic properties, obtained from the suprarenal gland of the sheep or other animal.

Epinephrine is a finely crystalline white or yellowish powder, odorless and slightly bitter. It melts at 201 to 207° C. (393.8 to 404.6° F.), turning brown and decomposing at the higher temperature.

The alkaloid shows a slightly alkaline reaction to moistened red litmus paper. It is almost insoluble in cold water, more readily in hot water. It is difficultly soluble in alcohol and insoluble in ether. The colorless aqueous solution of the alkaloid is easily oxidized on contact with the air, becoming pink, then red, and eventually brown. The base reacts with acids to form salts which are readily soluble in water; it is also soluble in the fixed alkalies, but not in ammonium hydroxide or in solutions of the alkaline carbonates. The following reactions are the most characteristic: The addition of ferric chloride to a solution of the alkaloid produces a beautiful emerald-green color which by careful addition of caustic alkali becomes purple, and then carmine red. Strong acid prevents the reaction with ferric chloride, limiting the change of color to a dirty yellowish-green. It gives a vivid pink color with iodine. The alkaloid reduces silver salts and gold chloride very energetically, and the liquid turns red. A drop of 1:10,000 solution instilled into the eye will, within a few seconds, produce a pallor of the conjunctiva.

Its incompatibilities are the same as those of other alkaloids. Its solutions should be kept tightly stoppered and protected from the light.

Actions and Uses.—Epinephrine acts peripherally on a variety of structures, probably by stimulating the sympathetic nerve endings. Its most important therapeutic actions consist in a constriction of the blood vessels, with consequent high rise of blood-pressure; a stimulation of the vagus center with slowing of the heart, and a direct stimulant and tonic effect on the heart muscle, similar to digitalis. Large doses also cause glycosuria. Continued administration of large doses leads to atheroma. The effect of a single dose is very fleeting. It is not irritant. The effects are seen on local application and intravenous and intramuscular injection. When given to animals, by mouth or hypodermically, moderate doses have almost no action.

Dilute watery solutions rapidly lose their strength, the deterioration being accompanied by a reddish or brownish discoloration.

The alkaloid is chiefly used locally for its vasoconstrictor action, in hemorrhage, and in catarrhal and congestive conditions. It is said to cut short the asthmatic paroxysm (being used by spraying the larynx and by hypodermic injections). Intravenous injections are effective in shock and anesthesia accidents (care being taken not to give an overdose). It has also been recommended in heart disease, Addison's disease, etc., but opinions are divided as to the benefits to be expected from oral administration.

The vasoconstrictor action of epinephrine is used to intensify and prolong the anesthetic effect of local anesthetics by retarding the circulation in the affected part and thus hindering the dilution of the anesthetic agent by too rapid absorption into the general blood-stream.

Dosage.—From 0.3 to 2.0 Cc. (5 to 30 minims of a 1:1,000 solution every two or three hours. Hypodermically, 0.06 to 1 Cc. (1 to 15 minims) of a 1:1,000 solution, diluted with sterile water. Locally it is used in solution varying in strength from 1:15,000 to 1:1,000, for ordinary applications, in oily solution for sprays, in ointment for application to mucous membranes, such as the eye or the nose when a

slower but more lasting action is desired, and in suppositories. Since the alkaloid is insoluble, solutions in water should be made of some salt, but for the oily solutions the alkaloid itself should be employed.

Proprietary Preparations:

ADNEPHRIN.—The name used for epinephrine by F. Stearns & Co., Detroit, Mich.

Adnephlin Emollient.—An ointment composed of adnephlin and a neutral base (1:1,000).

Adnephlin Oil Spray.—A 1:1,000 solution of adnephlin in a neutral oil, aromatized.

Adnephlin Solution.—A sterile solution (1:1,000) of adnephlin in physiologic salt solution containing one-half of 1 per cent. of methaform (chlorbutanol). A small proportion of sodium sulphite is added to the extraction of the glands.

Adnephlin Suppositories.—Each suppository represents a 1 to 1,000 combination of adnephlin with oil of theobroma and weighs about 1 Gm. (15 grains).

ADRENALIN.—The name used for ephrinephrine by Parke, Davis & Co., Detroit, Mich. It is prepared by the method of Takamine.

For Tests, Incompatibilities, Actions and Uses see Epinephrine. U. S. patents Nos. 780,175, 780,176, 780,196, 780,197, 780,198 (June 2, 1903; expires 1920); 753,177 (Feb. 28, 1904; expires 1921). U. S. trademark.

Adrenalin Chloride Solution.—A 1:1,000 solution of adrenalin hydrochloride in physiologic salt solution, preserved by the addition of 0.5 per cent. of chloretone (chlorbutanol).

Adrenalin Inhalant.—A neutral oily solution containing adrenalin chloride 1:1,000, 3 per cent. of chloretone, 13 per cent. of alcohol and aromatics.

Adrenalin Ointment.—One part of adrenalin chloride in 1,000 parts of oleaginous ointment base.

Adrenalin and Chloretone Ointment.—Contains 0.1 per cent. of adrenalin chloride, and 5 per cent. of chloretone in an ointment base of hydrous wool fat and petrolatum.

Adrenalin Suppositories.—1 part of adrenalin to 1,000 parts of oil of theobroma (cacao butter). Each suppository weighs about 1 Gm. (15 grains).

Adrenalin Tablets.—Each tablet contains 0.001 Gm. (3/200 grain) adrenalin, as borate, yielding a 1:1,000 solution when dissolved in 15 minims (1 Cc.) of water.

Adrenalin and Cocaine Tablets.—Each hypodermic tablet contains cocaine hydrochloride 0.01 Gm. (1/20 grain), and adrenalin, as borate, 0.0002 Gm. (1/800 grain).

PURIFIED EXTRACT OF ADRENAL GLAND—Mulford.—Purified extract of adrenal gland, Mulford, is an extract of the suprarenal gland, standardized physiologically by measuring its effect on blood pressure and so adjusted as to correspond to the effect of 4 per cent. of purified epinephrine. It has therefore approximately four times the strength of desiccated and suprarenal gland U. S. P.

Actions and Uses.—See Epinephrine.

Manufactured by H. K. Mulford Company, Philadelphia. Not patented or trademarked.

Adrenal Ointment, Mulford.—The ointment contains purified extract of adrenal gland, Mulford, 25 parts, boric acid 1 part in an ointment base consisting of a mixture of petrolatum and anhydrous lanolin scented with oil of wintergreen and oil of eucalyptus, sufficient to make 1,000 parts.

Dosage.—Adrenal ointment is supplied in quarter and half-ounce collapsible tubes.

Urethral Suppositories Adrenal Comp., Mulford.—Each suppository contains purified extract of adrenal gland 0.06 Gm. (1 grain), cargentos 0.13 Gm. (2 grains), boroglyceride and gelatine in sufficient quantity.

Vaginal Suppositories Adrenal Comp., Mulford.—Each suppository contains purified extract of adrenal gland 0.06 Gm. (1 grain), cargentos 0.13 Gm. (2 grains), ichthyol 0.13 Gm. (2 grains), with a boroglyceride and gelatine base.

SUPRARENALIN.—The name used for epinephrine by Armour & Co., Chicago.

An organic base is used for the final precipitation.
U. S. patent No. 829,220 (Aug. 21, 1906; expires 1923).

Suprarenalin Inhalant.—A 1:1,000 solution of suprarenalin in an aromatized oil, containing approximately 10 per cent. of alcohol.

Suprarenalin Ointment.—An ointment containing 0.1 per cent. of suprarenalin, dissolved in a petrolatum base.

Suprarenalin Solution.—A 1:1,000 solution of suprarenalin sulphite in normal saline solution, free from other preservatives.

Suprarenalin Triturates.—Triturates composed of suprarenalin, milk sugar and boric acid, in such proportions that each 0.03 Gm. ($\frac{1}{2}$ grain) triturate, dissolved in 15 minims of water, yields a 1:1,000 solution.

SUPRARENAL LIQUID.—Liquor Suprarenalis (P. D. & Co.).—Suprarenal liquid is an aqueous extract of suprarenal glands, preserved with 0.8 per cent. of chlorbutanol (chlorethane). Each Cc. (16 minims) of the solution represents 1 Gm. (15.4 grains) of the fresh glands.

Dosage.—The preparation is used undiluted for spraying, especially for mucous membranes.

Prepared by Parke, Davis & Co., Detroit, Mich.

ERGOTININE CITRATE.—Ergotinine Citras.—The citrate or ergotinine, a crystalline alkaloid, probably $C_{35}H_{39}O_5N_5$ (Barger and Carr), derived from ergot.

Ergotinine is obtained by extracting the residue left on evaporation of an alcoholic tincture of ergot with light petroleum to remove oily matter, dissolving the residue in ethyl acetate and shaking with citric acid solution. Sodium bromide or hydro-bromic acid is then added and the precipitated hydrobromides of the alkaloids, ergotinine and ergotoxine are collected. The mixed hydrobromides are dissolved in caustic soda and shaken with ether; in this way ergotinine is removed first. Finally, the ergotinine is crystallized from alcohol, leaving ergotoxine and impurities in the mother liquor. By interaction of ergotinine with citric acid, ergotinine citrate is obtained.

Ergotinine citrate is a grayish-white, amorphous powder, slowly soluble in water; it has an acid reaction to litmus paper.

Ergotinine crystallizes in long needles, the sides of which are not quite parallel, which darken and melt at temperatures from 219° to 229° C. One part of ergotinine dissolves at 18° in 292 parts of alcohol, 1,020 parts of absolute ether, in 91 parts of ethyl acetate, and is moderately soluble in acetone and benzene, and readily soluble in chloroform. It is insoluble in light petroleum and in water. Its specific rotation in alcoholic solution saturated in the cold is + 338°. It forms salts which produce colloidal solutions in water which are precipitated by electrolytes so that they are little soluble in the presence of the stronger mineral acids.

Tests: Ergotinine citrate when carefully decomposed by alkali, the mixture extracted with ether and the ether evaporated, yields a residue which responds to the test for ergotinine. Solutions of ergotinine have a bluish-violet fluorescence, especially when acidified. Concentrated sulphuric acid colors the alkaloid at first yellow, after some hours violet and at length blue. If a small quantity of ergotinine is dissolved in concentrated sulphuric acid and a trace of ferric chloride added, the mixture takes on an orange red coloration, which soon passes into red, while the edges of the liquid are colored blue or bluish-green.

If a few milligrams of ergotinine are dissolved in about 4 Cc. of glacial acetic acid, a trace of ferric chloride added and the mix-

ture underlaid with concentrated sulphuric acid, a beautiful violet color appears at the junction of the two liquids.

Actions and Uses.—According to the investigations of Barger and Dale, ergotinine has very slight physiologic activity when it enters the system unchanged, but it is liable to be converted to a certain extent into ergotoxin, which possesses marked physiologic activity and appears to represent the pharmacologic actions of ergot. The action of ergotinine when given by mouth or when injected hypodermically, is variable in intensity but represents the action of ergot.

Ergotinine citrate can be used as a substitute for ergot, and is said to act efficiently, when injected hypodermically, in the treatment of headaches and of uterine hemorrhage.

Dosage.—From .00032 to .00064 Gm. (1/200 to 1/100 grain), hypodermically.

Manufactured by Burroughs, Wellcome & Co., London, England, and New York. Not patented or trademarked.

Tablet Ergotinine Citrate.—Each tablet contains ergotinine citrate 0.00032 Gm. (1/200 grain).

EXTRACT OF ERGOT, PURIFIED.—*Extractum Ergotæ Purificatum.*—Ergotin Bonjean. *Extractum secalis cornuti* (Pharm. Helvetica, edit. 4); *Extractum ergoti* (Pharm. Française, 1908). Purified extract of ergot is an aqueous extract of ergot purified by alcohol.

Powdered ergot is extracted by percolation with water and the percolate concentrated, diluted with alcohol, allowed to stand, then filtered and the filtrate evaporated to a soft extract.

It is reddish-brown, of characteristic odor and taste, soluble in water and in a mixture of equal parts of water and alcohol. The aqueous solution is yellowish-brown and acid in reaction (Pharm. Helvetica, edit. 4).

If 2 Cc. of an aqueous solution (1:20) is mixed with 7 Cc. of water and 1 Cc. Mayer's reagent, there should appear at most but slight turbidity; the turbidity is increased by the addition of a trace of hydrochloric acid; the further addition of 5 drops of dilute acid produces within a few minutes a flocculent precipitate.

10 Cc. of a 1:20 solution of purified extract of ergot should become turbid upon the addition of 1 Cc. picric acid solution and precipitation should occur within five minutes.

If a solution of 0.2 Gm. purified extract of ergot in 5 Cc. water is made alkaline with 1 to 2 drops of ammonia water and then shaken out with ether, the ether extract evaporated and the residue dissolved in 2 Cc. acetic acid to which a trace of ferric chloride has been added and the mixture carefully poured upon concentrated sulphuric acid, a bluish-violet color appears at the zone of contact (Pharm. Helvetica, edit. 4).

Action and Uses.—Purified extract of ergot has the action and uses of ergot.

Dosage.—From 0.2 to 0.5 Gm. (3 to 8 grains).

This preparation should not be confused with the following:

Ergotin Wernich (Pure Dried) is a purified and dialyzed dried aqueous extract of ergot.

Ergotin Wernich (Liquid) is a dialyzed extract of ergot, in the form of a reddish-brown liquid.

Ergotin Wernich (Soft) is a purified and dialyzed soft extract of ergot; a reddish-brown syrupy liquid.

Ergotin Wiggers (Pure Dried) is a dried, alcohol-purified extract of ergot.

Ergotin Yvon is a fluidextract of ergot prepared by extracting with dilute solution of tartaric acid.

EUCAINE.

The "eucaines" are two closely allied synthetic bases, differentiated as eucaine "A" and eucaine "B," or "Alpha-eucaine" and "Beta-eucaine," alpha-eucaine being a synthetic derivative of triceonamine, while beta-eucaine is a synthetic derivative of vinyl-diacetone-alkaline.

Alpha-Eucaine Hydrochloride has been withdrawn from the American market by the agents, Schering & Glatz, New York.

BETA-EUCAINE HYDROCHLORIDE.—Beta-Eucaine Hydrochloridum. —Trimethylbenzoxypiperidinium Hydrochloricum (Pharm. Helvetica, edit. 4). Eucaium Hydrochloricum β (Pharm. Hungarica, edit. 3). Chloretum Eucaicum (Pharm. Danica, 1907). Eucaine Hydrochloride β . Beta-eucaine hydrochloride, $C_5H_7N(CH_3)_3(C_6H_5COO).HCl$, is 2,6,6-trimethyl-4-benzoxy-piperidine hydrochloride.

It is prepared by treating diacetoneamine with paraldehyde, reducing the product with metallic sodium, benzoylating the vinyl-diacetonalkaline (melting at $138^\circ C.$) so produced by treatment with benzoylchloride, neutralizing the resulting benzoyl-vinyl-diacetonalkaline (trimethyl-benzoxypiperidine) with hydrochloric acid and crystallizing.

It forms a white crystalline powder, soluble in 20 to 30 parts of water at the ordinary temperature, but more soluble in warm water, soluble in 25 to 30 parts of alcohol, producing neutral solutions which can be sterilized by boiling without change. The aqueous solutions yield either soluble precipitates of the free base on addition of alkali hydroxides or carbonates. Ammonia water produces a precipitate which redissolves, but is reprecipitated on the addition of more ammonia.

The saturated aqueous solution gives a precipitate with mercuric chloride, which distinguishes it from the corresponding alpha-eucaine salt. It gives no color reactions with sulphuric or nitric acid, but yields a yellow precipitate with chromic acid, orange yellow with bismuth-potassium iodide, lemon yellow with picric acid and a white precipitate with phosphomolybdic acid. It is incompatible with alkalies and their carbonates.

If to a solution of 0.1 Gm. of beta-eucaine hydrochloride in 20 Cc. of water 1 drop of ammonia water (10 per cent.) is added, a white precipitate is produced which gradually disappears on shaking. If 3 drops more of ammonia water are added, a precipitate again occurs which dissolves on the addition of 20 Cc. of water. Further addition of ammonia produces a precipitate which is again dissolved on the addition of 10 Cc. of water. If to this liquid ammonia is again added no precipitate occurs, but merely a milky turbidity, which disappears on the addition of water.

Beta-eucaine hydrochloride dissolves in sulphuric acid without color.

If 1 drop of a 1 per cent. solution is mixed with 1 drop of mercuric chloride test solution no precipitate should occur (absence of cocaine and alpha-eucaine).

0.1 Gm. of beta-eucaine hydrochloride should leave no weighable residue on incineration.

If 0.3 Gm. to 0.5 Gm. eucaine hydrochloride be weighed and dissolved in 100 Cc. of alcohol the titration of this solution with tenth normal sodium hydroxide solution, using phenolphthalein as indicator, will require 1 Cc. of the tenth normal alkali for each 0.0269 Gm. eucaine hydrochloride present.

If 0.3 Gm. to 0.5 Gm. eucaine hydrochloride be weighed and dissolved in water made alkaline, with ammonia water, and the solution extracted with chloroform, the evaporation of the chloroform should leave a residue which, when dried, should weigh not less than 86.56 per cent. of the material taken.

Actions and Uses.—Beta-eucaine hydrochloride is a local anesthetic like cocaine, but weaker and devoid of the stimulating properties of the latter. It does not dilate the pupil, nor does it contract the blood-vessels as does cocaine. It has the advantage of stability even on prolonged boiling. It may be used in all cases in which cocaine is indicated as a local anesthetic, especially in ophthalmology.

Dosage.—It may be applied in a 2 to 3 per cent. solution to the eye, 5 to 10 per cent. for nose and throat and 5 to 10 per cent. for ointment for hemorrhoids.

Manufactured by Chemische Fabrik auf Actien, vorm. E. Schering, Berlin, Germany (Schering & Glatz, New York). U. S. patent No. 657,880 (Sept. 11, 1900; expires 1917). German patent No. 97,672.

BETA-EUCAINE LACTATE.—*Beta-Eucainæ Lactas.*—Beta-eucaine lactate, $C_8H_7N(CH_3)_3(C_6H_5COO).C_3H_5O_3$, is 2,6,6-trimethyl-4-benzoxypiperidine lactate.

It is prepared in a manner similar to the method for beta-eucaine hydrochloride, lactic acid being substituted for hydrochloric.

Beta-eucaine lactate forms a white crystalline powder soluble in about 5 parts of water at the ordinary temperature, in 10 parts alcohol and in 5 parts chloroform and in fatty oils with the aid of chloroform. It melts at about $152^\circ C.$ ($305.6^\circ F.$). The aqueous solution is freely alkaline to litmus. In aqueous solutions the base can be thrown down by solutions of sodium or potassium hydroxide as an oily deposit which solidifies after a time. Ammonia produces a precipitate which redissolves, but is reprecipitated on the addition of more ammonia.

Tests: The precipitate caused by 4 drops of ammonia water (10 per cent.) in a solution of 0.1 Gm. of beta-eucaine lactate in 20 Cc. of water is redissolved on the addition of 20 Cc. of water.

If a few drops of diluted sulphuric acid and 1 Cc. of potassium bichlorate solution (1:10) are added to 0.1 Gm. of eucaine lactate, heating develops an odor of acetaldehyde.

0.1 Gm. of eucaine lactate should dissolve without coloration in 1 Cc. of cold sulphuric acid (sp. gr. 1.84); 0.2 Gm. of eucaine lactate, on combustion, should leave no weighable residue.

If 0.3 Gm. to 0.5 Gm. eucaine lactate be weighed and dissolved in 100 Cc. of alcohol, the titration of this solution with tenth normal sodium hydroxide, using phenolphthalein as indicator, will require 1 Cc. of the tenth normal alkali for each 0.0223 Gm. of eucaine lactate present.

If 0.3 Gm. to 0.5 Gm. eucaine lactate be weighed and dissolved in water made alkaline with ammonia water, and the solution extracted with chloroform, the evaporation of the latter should leave a residue which when dried should weigh not less than 72.30 per cent. of the material taken.

Actions and Uses.—The same as those of beta-eucaine-hydrochloride, over which it possesses the advantage of greater solubility.

Dosage.—For hypodermic injections, from 2 to 4 per cent. solutions (preferably in 0.6 to 1.0 per cent. sodium chloride solution with or without epinephrine); in the eye, from 1 to 2 per cent. solutions; for penciling or tamponading mucous membranes, from 10 to 15 per cent. solutions; for infiltration, from 1 to 500 solutions with sodium chloride 0.6 to 1 per cent. and epinephrine; for painful wounds, from 5 to 10 per cent. ointments with wool fat (*adeps lanæ*).

Manufactured by Chemische Fabrik auf Actien, vorm. E. Schering, Berlin, Germany (Schering & Glatz, New York). U. S. patent No. 657,880 (Sept. 11, 1900; expires 1917).

EUMYDRIN.—*Methylatropinæ Nitras.*—*Atropinmethyl Nitrate.*—Eumydrin, $C_8H_5(HO.CH_2)CH.CO_2.C_7H_{11}N(CH_3)_2NO_3$, is the nitrate of methylated atropine.

It is obtained by the interaction of methyl-atropine halide with metallic nitrates, or by treatment of the methyl atropine base with nitric acid, by interaction of atropine with methyl nitrate and by other patented processes.

It is a white, crystalline salt, melting at 163° C. (325.4° F.), odorless, permanent and readily soluble in water or alcohol, but very sparingly soluble in ether or chloroform. A quantity of 100 parts contains atropine equivalent to about 90 parts of atropine sulphate.

On warming 0.01 Gm. of eumydrin with 1.5 Cc. of sulphuric acid until the solution begins to darken, and at once adding, carefully, 2 Cc. of water a violet color develops and at the same time a faint, peculiar aromatic odor appears. A solution of 0.05 Gm. of eumydrin in 3 Cc. of water remains clear on the addition of either 1 Cc. of sodium hydroxide solution or of ammonia water.

Being an alkaloidal salt, it is incompatible with alkaline solutions, etc.

Actions and Uses.—Eumydrin is a mydriatic and antihidrotic, replacing atropine sulphate both internally and externally in corresponding doses. It is claimed that it dilates the pupil more rapidly than atropine and the dilatation is of shorter duration—being intermediate in these respects between atropine and homatropine. It is said to be much less toxic than atropine, so that larger doses may be given to secure the effect. It is said to be particularly useful in the treatment of night sweats and whooping cough and for the relief of enuresis.

Dosage.—Internally, as an antihidrotic, from 0.001 to 0.0025 Gm. (1/60 to 1/24 grain). Externally, as a mydriatic, in solutions about one-tenth stronger than the usual atropine solutions.

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Farbenfabriken of Elberfeld Co., New York). German patents Nos. 137,622 and 138,443.

EUPHORIN.—*Æthylis Phenylcarbamas.*—Phenyl Urethane—Phenylethylurethane—Phenylcarbamic Acid Ethyl Ester.—Euphorin, $(C_6H_5.NH.CO.(OC_2H_5))$, is a compound closely allied to *æthylis carbamas*, U. S. P. (urethane) and differing from this by the replacement of the group NH_2 by NHC_2H_5 .

It is prepared by the action of aniline on chloroformic acid ethyl ester.

It forms colorless needles or a white powder, melting at 50° – 51° C. (122° to 123.8° F.), having a faint aromatic odor and clove-like taste. It is almost insoluble in water, readily soluble in diluted alcohol, in alcohol and in ether.

Actions and Uses.—Euphorin is anodyne, antipyretic and antiseptic.

It is said to be useful in rheumatism, sciatica, headache, etc. Externally it is recommended to be applied as a dusting powder in venereal and skin diseases, ulcers, burns, etc.

Dosage.—From 0.5 to 1 Gm. (8 to 15 grains) dissolved in wine or suspended in water; externally in powder, in lanolin ointment and in superfatted soap.

Manufactured by Fabrik von Heyden, Radebeul, near Dresden, Germany. U. S. trademark.

EUROPHEN.—*Di-Isobutyl-Cresol Iodine.*—Europhen, $C_6H_5(C_4H_9)(CH_3)(OI).C_6H_5(CH_3)(:O)(C_4H_9)$, is a condensation product of 2 molecules of isobutylorthocresol, with 1 atom of iodine, analogous to *Thymolis Iodidum*, U. S. P.

It is prepared by the addition of a solution of iodine in potassium iodide to an alkaline solution of isobutylcresol, washing the precipitate with water and drying it at a moderate temperature.

It forms a yellow, voluminous powder, fusing at 110° C. (230° F.), containing 28 per cent. of iodine and having a faint saffron-like odor. It is insoluble in water or glycerine, but readily soluble in

alcohol, ether, chloroform and the fixed oils. It is permanent in the dry state, but splits off iodine readily when moistened and rapidly when heated with water at 70° C. (158° F.), particularly in the presence of alkalies.

When triturated with glycerine and water it yields a filtrate which is turned bluish by the addition of freshly prepared starch paste. Its alcoholic solution produces a yellow precipitate with mercuric chloride.

It should not be exposed to heat, light or damp air; it is incompatible with starch, metallic oxides, mercuric salts, and alkaline hydrates and carbonates.

Actions and Uses.—The action of euophen is similar to that of iodoform and thymol iodide. It is claimed to be used especially in the treatment of venereal ulcerations.

Dosage.—Euophen may be given internally in the form of pills in doses of from 0.2 to 0.3 Gm. (3 to 5 grains). Locally it may be used as a dusting powder in substance or mixed with an equal quantity of finely powdered boric acid, as an ointment, with wool fat (lanolin), or as a 5 per cent. embrocation, dissolved in olive oil.

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Farbenfabriken of Elberfeld Co., New York). U. S. patent No. 495,204 (expired); German patent No. 56,830. U. S. trademark No. 17,888.

FLUORESC EIN.—*Fluoresceinum.*—*Resorcinolphthalein* (a term not strictly correct but commonly used), *dioxyfluoran.*—*Fluorescein*, $O:(C_6H_3OH)_2:C_6H_4.COO$, is the anhydride of fluoresceinic acid, $O:(C_6H_3OH)_2:C(OH).C_6H_4(COOH)$.

Fluorescein is prepared by the fusion of phthalic anhydride and resorcinol at 195-200° C. (383-392° F.) till the mass becomes solid. This is extracted with water and the residue dissolved in potassium hydroxide solution, which is then filtered and the fluorescein precipitated with acid.

Fluorescein is an orange-red powder, insoluble in water, ether, chloroform and benzol; soluble in hot glacial acetic acid and boiling alcohol. It dissolves in alkaline solutions with formations of a salt.

The alkaline solution by transmitted light is red; by reflected light it has a green fluorescence even in very dilute solutions. When fluorescein is boiled with chalk and water the calcium salt of fluorescein is formed, which is recognized by its red-brown color and green sheen.

Actions and Uses.—The soluble sodium salt of fluorescein (fluorescein 2 Gm., sodium bicarbonate 3 Gm., water to make 100 Cc.) has been used for the diagnosis of corneal lesions and detection of minute foreign bodies imbedded in the cornea. While a weak solution of fluorescein will not stain the normal cornea, ulcers or parts deprived of epithelium will become green and remain so for a time; foreign bodies will appear surrounded by a green ring; loss of substance in the conjunctiva is indicated by a yellow hue. Fluorescein also reveals defects or disease of the endothelium of the cornea, producing a deep coloration of the diseased area.

Non-Proprietary Preparation:

Tablet (Ophthalmic) Fluorescein B-W. & Co.—Each tablet contains fluorescein 0.0026 Gm. (1-250 grain) in combination with sodium, and weighs 0.0032 Gm. (1-20 grain).

Prepared by Burroughs, Wellcome & Co., London, England, and New York.

FORMIC ACID.—*Acidum Formicum.*—*Acidum formicum* (Pharm. Helvetica, edit. 4; Pharm. Germanica, edit. 4).

Formic acid is a liquid containing 24 to 25 per cent. of anhydrous formic acid (HCOOH).

Formic acid is a clear, colorless liquid possessing a sharp acid odor and taste. It has a specific gravity of 1.058-1.061. With lead acetate, formic acid produces a white crystalline precipitate. On warming with silver nitrate a gray turbidity and with mercuric chloride a white turbidity is produced. A solution (1-10) after the addition of a few drops of nitric acid should yield no precipitate with silver nitrate or barium chloride; and after neutralizing, with ammonia water, calcium chloride or hydrogen sulphide should produce no precipitate. If 1 Cc. formic acid is mixed with 5 Cc. water and 1.5 Gm. mercuric oxide (yellow) and heated on the water bath there will follow an evolution of gas leaving a mixture which when filtered will yield a filtrate which should not react acid (acetic acid). If 5 Cc. to 6 Cc. formic acid be titrated with normal alkali, the alkali consumed should indicate the presence of not less than 254 Gm. anhydrous formic acid per liter. Each cubic centimeter of normal alkali is equivalent to 0.04567 Gm. anhydrous formic acid (HCOOH). The titrated solution should yield no burned or sharp odor (Pharm. Helv. and Pharm. Germ).

Actions and Uses.—The actions of formic acid resemble those of acetic acid but it is more volatile, more irritant and more antiseptic. Formic acid is much more resistant to oxidation in the body than the other organic acid, and is therefore excreted to a large extent as formates, in the urine. These have an irritant action on the kidneys and urinary tract, and are diuretic. Large doses cause methemoglobinemia, but the toxicity is rather low. It has no effect on the general circulation or on the motor system, as has been claimed. It has been lauded in a great variety of disorders, but there is no good evidence that its internal use produces any benefits other than psychical. Its external use as a counterirritant is rational, but it possesses no special advantage.

Dosage.—Internally, from 1 to 20 drops of the 25 per cent. acid, largely diluted; or from 0.1 to 0.25 Gm. ($1\frac{1}{2}$ to 4 grains) of sodium formate. Externally usually in a solution containing 1 per cent. of the absolute acid in alcohol or diluted alcohol.

GUAIACOL COMPOUNDS.

BENZOSOL.—*Gualacollis Benzoas.*—Gualacol Benzoate—Benzoyl-gualacol.—Benzosol, $\text{C}_6\text{H}_5\text{CO.O}(\text{C}_6\text{H}_4\text{OCH}_3)$, is methoxy-benzoxyl-benzene. It is closely related to gualacol, $\text{C}_6\text{H}_4(\text{OH})(\text{CH}_3)$, from which it differs in that the hydroxy-group is replaced by the benzoxy-group.

It is prepared by warming the potassium salt of gualacol with benzoyl chloride and crystallizing the product from hot alcohol.

It forms colorless, minute crystals which melt at 59° to 61° C. (138.2° to 141.8° F.); they are odorless and tasteless or nearly so. It is practically insoluble in water, sparingly soluble in ether, but readily soluble in hot alcohol. It contains 54 per cent. of gualacol.

It forms with sulphuric acid a permanent yellow coloration which on the addition of acetone assumes a characteristic, brilliant cherry red color, distinguishing it from salol, which gives a yellow color. Ferric chloride produces in the benzol sulphuric acid mixture a violet color, changing to green and blue, and on the further addition of nitric acid, to orange and green, or of potassium nitrite to green, violet and yellow. When heated (saponified) with alcohol potash, the odor of gualacol is developed.

It is incompatible with the alkalies, which split up benzosol into gualacol and benzoic acid.

Actions and Uses.—Benzosol is decomposed slowly in the intestinal tract into gualacol and benzoic acid, which exert their usual actions.

The liberated constituents are absorbed and excreted in the urine. It is claimed to be non-irritating.

Its uses are analogous to those of creosote and of benzoic acid. It is said to be useful in incipient pulmonary tuberculosis, as an intestinal antiseptic in fermentation, diarrhea, typhoid fever, diabetes mellitus and as a urinary disinfectant in cystitis, etc. (See note under Beta-naphthol Benzoate).

Dosage.—From 0.2 to 0.6 Gm. (3 to 10 grains), in powder, capsule, pill, or suspended in liquids or as an emulsion.

Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a.M., Germany (Farbwerke Hoechst Co., New York). U. S. patent No. 453,035 (expired).

GUAIACOL-SALOL.—Guaiaacolis Salicylas.—Salicylate of Guaiacol.—Guaiacol-salol is guaiaacyl salicylate, $C_6H_4.OH.CO.O.(C_6H_4.OCH_3)$, the salicylic acid ester of guaiacol, closely related to phenyl salicylate (salol).

It is prepared by treating a mixture of sodium salicylate and sodium guaiaacolate, in molecular proportions, with phosphorous oxychloride, washing the product of the reaction with water and crystallizing from alcohol.

It is a white crystalline powder, tasteless, but having a salol-like odor. It is insoluble in water, but soluble in alcohol, ether and chloroform. It melts at $65^{\circ} C.$ ($149^{\circ} F.$).

Being an ester, it is decomposed by alkalies and alkaline carbonates with the formation of alkali salicylate and alkali guaiaacol and salicylic acid. The alcoholic solution is colored wine red by the addition of ferric chloride, but if the alcoholic solution be dropped into a watery solution of ferric chloride a turbidity but no coloration is produced.

Actions and Uses.—This compound acts like its constituents, being antiseptic and antirheumatic. It is said to be useful in the diarrhea of tuberculosis, dysentery, rheumatism, marasmus, chorea, etc. (See note under Beta-naphthol Benzoate.)

Dosage.—1 Gm. (15 grains).

Manufactured by Fabrik von Heyden, Radebeul, near Dresden, Germany (Merck & Co., New York).

GLUTEN FOOD A, Barker's.—Barker's gluten food A is gluten flour prepared from wheat and contains not more than 4 per cent. of carbohydrates and 87 per cent. of protein.

Barker's gluten food A is made from wheat flour by elutriation.

It is a granular powder practically without odor or taste and is insoluble in water.

Actions and Uses.—Barker's gluten food A is indicated when a diet practically free from carbohydrates is desired, especially in most forms of diabetes. It can be taken uncooked or made into muffins.

The nutritive value of 500 Gm. of Barker's gluten food A corresponds to 1,850 calories, of which 1,740 are due to protein, 80 to carbohydrates and 30 to fat. (Rep. Conn. Agr. Exp. Sta., 1913, Part 1, p. 18.)

Manufactured by Herman Barker, Somerville, Mass. No. U. S. patent or trademark.

GLUTEN FOOD B, Barker's.—Barker's gluten food B is gluten flour prepared from wheat and contains not more than 7 per cent. of carbohydrates and 85 per cent. of protein.

Barker's gluten food B is made from wheat flour by elutriation. It is a granular powder practically without odor or taste and is insoluble in water.

Actions and Uses.—Barker's gluten food B is indicated when a diet practically free from carbohydrates is desired, especially in most forms of diabetes. It can be taken uncooked or made into muffins.

The nutritive value of 500 Gm. of Barker's gluten food B corresponds to 1,870 calories, of which 1,700 are due to protein, 140 to carbohydrates and 30 to fat. (Rep. Conn. Agr. Exp. Sta., 1913, Part 1, p. 18.)

Manufactured by Herman Barker, Somerville, Mass. No U. S. patent or trademark.

GLUTEN FOOD C, Barker's.—Barker's gluten food C is gluten flour prepared from wheat and contains not more than 12 per cent. of carbohydrates and 83 per cent. of protein.

Barker's gluten food C is made from wheat flour by elutriation. It is a granular powder practically without odor or taste and is insoluble in water.

Actions and Uses.—Barker's gluten food C is indicated when a diet practically free from carbohydrates is desired, especially in most forms of diabetes. It can be taken uncooked or made into muffins.

The nutritive value of 500 Gm. of Barker's gluten food C corresponds to 1,880 calories, of which 1,680 are due to protein, 170 to carbohydrates and 30 to fat. (Rep. Conn. Agr. Exp. Sta., 1913, Part 1, p. 18.)

Manufactured by Herman Barker, Somerville, Mass. No U. S. patent or trademark.

HEDONAL.—Methylpropylcarbinol Urethane.—Pentan-2-Olurethane.—Hedonal is pentan-2-ol urethane, $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}(\text{CH}_3)\text{O.CO.NH}_2$. It is a derivative of urethane differing from ethyl carbamate, U. S. P., in that the ethyl radicle has been replaced by the radicle of methylpropylcarbinol (pentan-2-ol). $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHOH.CH}_3$.

It is prepared by heating the secondary methylpropylcarbinol or pentan-2-ol, $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHOH.CH}_3$, with urea nitrate under pressure (U. S. patent No. 659,202), also by other methods (German patents Nos. 120,863, 120,864, 120,865).

It is a white, crystalline powder, having a faint aromatic odor and taste, melting at 74°C . (165.2°F .), and boiling at 215°C . (419°F .). It dissolves in 120 parts of water at 37°C . (98.6°F .), but is more soluble at higher temperatures and is readily soluble in alcohol, ether, chloroform and other organic solvents. It is readily volatilized with the vapors of water or alcohol, and when boiled with alkalis is split up into its constituents, methylpropylcarbinol, ammonia and carbon dioxide.

On boiling with dilute sodium hydroxide, ammonia is evolved and recognized by the odor and the usual reagents; if then an aqueous solution of iodine in potassium iodide is added, and the mixture allowed to cool, the odor of iodoform derived from the alcohol is distinctly manifested.

It is incompatible with alkalis, their carbonates and bicarbonates.

Actions and Uses.—Hedonal appears to have a greater hypnotic effect than ethyl carbamate. It is said to have no after-effects and is

oxidized in the body to urea and carbon dioxide. It is employed in insomnia due to mental overwork or nervous excitement occurring in the course of neurasthenia or hysteria. It is claimed to be particularly useful preliminary to anesthesia, a hypnotic dose being given and anesthesia effected with chloroform after the patient has been asleep for an hour.

Dosage.—From 1 to 2 Gm. (15 to 30 grains), administered dry, followed by a swallow of water, or in wafers or capsules.

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Farbenfabriken of Elberfeld Co., New York). U. S. patent No. 659,202 (Oct. 9, 1900; expires 1917); German patents Nos. 11,496, 120,863, 120,864, 120,865.

Hedonal Tablets, 8 grains.—Each tablet contains hedonal 0.52 Gm. (8 grains).

HEDIOSIT.—Hediosit is the lactone or inner anhydride, $C_{17}H_{12}N_7$, of alpha-glucoheptonic acid, $CH_2OH.(CHOH)_5COOH$.

Hediosit is prepared by treating glucose with hydrocyanic acid, the condensation product being treated with barium hydroxide and the lactone of alpha-glucoheptonic acid liberated by the addition of sulphuric acid. This solution is evaporated and the product is then recrystallized.

Hediosit is a white, crystalline, odorless powder, possessing a sweet taste. It is readily soluble in water, slightly soluble in alcohol and almost insoluble in ether. The aqueous solution is acid toward litmus.

If hediosit be heated with concentrated sulphuric acid, foaming and carbonizing take place with evolution of carbon monoxide.

If 1.0 Gm. of hediosit be heated on a boiling water bath with 1 Cc. of water and 0.5 Gm. of phenylhydrazine, and a few Cc. of absolute alcohol added, a light-colored crystalline mass will form, which after recrystallization from dilute alcohol melts at 172° C.

An aqueous solution (1:19) of hediosit should be clear and colorless and should not be altered by hydrogen sulphide, sulphuric acid, barium chloride solution or ammonia water.

If 1 Cc. of the above solution be boiled with 3 Cc. of Fehling's solution no precipitate should be formed.

If 1 Cc. of the aqueous solution be warmed with a few drops of ferrous sulphate and of ferric chloride solution, no blue color should appear on acidifying with hydrochloric acid.

If 0.5 Gm. of hediosit be incinerated, no weighable residue should remain.

If 1 Gm. to 2 Gm. of hediosit weighed into a flask be dissolved in 10 to 20 Cc. of water by warming and a few drops of phenolphthalein solution added, 9.1 to 9.6 Cc. of half normal sodium hydroxide per Gm. of hediosit taken should be required to neutralize the solution.

If 8 Gm. of hediosit be dissolved in water to make 100 Cc. and allowed to stand at the ordinary temperature for 24 hours the solution, when polarized at 17° C., should show a specific rotation of about -52° for the sodium line. After neutralization with caustic soda the solution has a slight dextro-rotation.

Actions and Uses.—Hediosit is said not to be poisonous, and when given even to diabetic patients, not to increase the amount of glucose in the urine, but rather to decrease it. A portion of the hediosit amounting to from 10 to 20 per cent. appears in the urine of dogs as an alkali salt. Since hediosit is oxidized in the system it is claimed to have a food value equal to the same amount of glucose.

Hediosit is said to be useful as a sweetener of the food of diabetic patients, having at the same time a certain food value.

Dosage.—From 10 to 30 Gm. (3 drams to 1 ounce). Hediosit should not be given to the extent of causing laxative action. It is therefore recommended to prescribe a single dose of 10 Gm. ($2\frac{1}{2}$ drams) daily or 10 Gm. three times a day every third or fourth day.

Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a.M., Germany (Farbwerke Hoechst Company, New York). U. S. patent No. 1,057,437 (April 1, 1913; expires 1930). U. S. trademark applied for.

HEMABOLOIDS.—Hemaboloids is a liquid said to contain in each 100 Cc. iron, combined with proteins, equivalent to 0.40 Gm. elementary iron, proteins and nucleoproteins (nitrogen x 6.25) 4.0 Gm., bone marrow extract 5.0 Gm., nuclein 0.04 Gm., in a menstruum containing 17 per cent. alcohol by volume. It is claimed that 75 per cent. of the iron is in a stable organic combination with vegetable nucleoproteins and does not react with hematoxylin (see Organic Iron), while the remaining 25 per cent. is more loosely combined.

Actions and Uses.—Hemaboloids is claimed to act as a promptly absorbable and non-irritant form of food-iron. It is said not to constipate nor stain the teeth.

Dosage.—15 Cc. ($\frac{1}{2}$ fluidounce) after each meal. Children in proportion. Each average dose of 15 Cc. ($\frac{1}{2}$ fluidounce) contains iron 0.06 Gm. (0.92 grains), proteins and nucleoproteins 0.62 Gm. (9.6 grains), bone marrow extract 0.775 Gm. (12 grains), nuclein 0.006 Gm. (0.1 grain).

Manufactured by the Palsade Manufacturing Company, Yonkers, N. Y. U. S. trademark.

HOLADIN.—*Extractum Pancreaticum Integrum.*—An extract of the entire pancreas containing all the constituents of the gland and exhibiting great potency in respect to the several known enzymes, trypsin, amyllopsin, lipase and the milk-curdling ferment.

Holadin is a grayish-white powder, slightly aromatized, somewhat hygroscopic, freely but not wholly soluble in water.

Tests.—The tryptic power is tested as follows: 0.10 Gm. is placed in a flask, mixed by agitation with 25 Cc. of tepid water containing 0.20 Gm. sodium bicarbonate; at once 100 Cc. of milk at 40° C. is added, and then the flask kept in a water bath at 40° C. From time to time small portions are withdrawn in a beaker glass, when the addition of a few drops of dilute acetic acid will show a constant diminution in the volume and character of the curd until finally only minute, flocculent coagula are observed. Holadin should not remain in contact with sodium bicarbonate for more than a brief interval before adding the milk, as its enzymic power is rapidly decreased thereby.

To test for the fat splitting action, 0.10 Gm. of holadin is mixed with 25 Cc. of water and 100 Cc. of milk and maintained at 40° C. In about 15 minutes the presence of fatty acids can be detected by odor and taste and confirmed by chemical tests.

The action of the milk-curdling ferment is shown in the following way: 0.02 Gm. holadin is mixed with 10 Cc. water in a beaker and then 100 Cc. fresh milk, previously warmed to 40° C., poured on, with sufficient stirring to mix thoroughly, and the mixture digested, without agitation, in a water bath at 40° C. In a few minutes the milk will begin to show the characteristic evidences of curdling similar to that produced by the milk-curdling ferment of the gastric juice. When the milk, however, has acquired a semi-solid jelly-like consistency, if it then be stirred constantly with a glass rod, the curd will break down, become diffusible and in time disappear, a behavior which is in marked contrast to the action of the milk-curdling ferment of the gastric juice which causes the formation of a firm curd, easily separable from the whey.

The starch-converting power is determined as follows: Triturate 15 Gm. of arrowroot of potato starch with 500 Cc. of distilled water, boil for 10 minutes, allow to cool, and make up to 500 Cc. with distilled water. Prepare an iodine test solution by diluting 0.5 Cc. of liquor iodi compositus, U. S. P., with water to make 500 Cc. and have ready sufficient number of tubes containing an equal quantity of this solution.

If holadin be treated as given below the results should indicate that it converts 135 times its own weight of starch in ten minutes and six hundred times its weight in sixty minutes.

Triturate 0.130 Gm. holadin in a perfectly dry mortar with 1.170 Gm. of lactose. Place 100 Gm. of the starch mucilage in a Florence flask in a water bath at 40° C. and mark "A;" place in the water bath also another flask of the same content and mark "B." Add to flask "A" 0.20 Gm. of the holadin triturate; to flask "B" add 0.05 Gm. of the holadin triturate; maintain both flasks in the water bath at 40° C. At the expiration of ten minutes withdraw from flask "A" one drop of the solution and add to one of the tubes of the iodine solution, when no coloration will occur. At the end of fifty minutes take one drop from flask "B" and add to one of the tubes of iodine solution, and at intervals of a few minutes repeat this; in about sixty minutes, no coloration, or at the most a very faint coloration, will appear. Under these circumstances, one grain of holadin will convert 135 grains of starch completely in ten minutes, and 600 grains in about sixty minutes.

Actions and Uses.—Holadin has power to digest starch and proteids and to split fats. It is claimed to be useful in various diseases in which digestion of food is imperfect.

Dosage.—Holadin is furnished only in capsules, each capsule containing approximately three grains. One capsule should be given about three hours after meals and one capsule at bedtime. The dose can be gradually increased to two or three capsules at a time.

Manufactured by Fairchild Bros. & Foster, New York. U. S. trademark No. 60,625.

Holadin and Bile Salts, Fairchild.—This preparation is a mixture of holadin 5 parts with bile salts, Fairchild (which see) 1 part, put up in 3 grain capsules, containing holadin approximately 0.15 Gm. (2½ grains) and bile salts 0.03 Gm. (½ grain).

Dosage.—One capsule about three hours after meals and one capsule at bedtime.

Capsule of Holadin, Bile Salts and Phenolphthalein.—Each capsule contains holadin, 0.13 Gm. (2 grains), bile salts, Fairchild 0.03 Gm. (½ grain), Phenolphthalein 0.065 Gm. (1 grain).

Capsules of Holadin, Succinate of Soda and Bile Salts.—Each capsule contains Holadin 0.20 Gm. (3 grains), Sodium Succinate Exsiccated 0.20 Gm. (3 grains) and Bile Salts, Fairchild 0.03 Gm. (½ grain).

HOLOCAINE HYDROCHLORIDE.—*Holocainæ Hydrochloridum.*—Ethenyl-Paradiethoxy-Diphenyl-Amidine Hydrochloride.—Holocaine hydrochloride is phenetidyl-acetphenetidin hydrochloride, $\text{CH}_3\text{C}(:\text{N.C}_6\text{H}_4.\text{OC}_2\text{H}_5)(\text{NH.C}_6\text{H}_4.\text{OC}_2\text{H}_5).\text{HCl}$. Phenetidyl-acetphenetidin hydrochloride is the hydrochloride of a basic condensation product of paraphenetidin (para-ethoxyamino-benzene) and acetparaphenetidin (phenacetin).

It is prepared by the interaction of molecular proportions of paraphenetidin sulphate and acetphenetidin (phenacetin) in the presence of phosphorus oxychloride, decomposing the resulting holocaine sulphate with sodium hydroxide, crystallizing the base from alcohol, neutralizing it with hydrochloric acid, and crystallizing.

It forms small, colorless crystals, neutral or faintly alkaline, melting at 189° C. (372.2° F.), odorless, faintly bitter and producing transient numbness on the tongue. It is soluble in 60 parts of water and freely soluble in alcohol. On boiling in glass vessels the aqueous solution becomes turbid, owing to a separation of a small quantity of the free base by alkali derived from the glass.

It should form a clear, colorless solution in water, neutral or faintly alkaline, yielding a white precipitate on addition of silver nitrate or of ammonia. The base obtained by precipitation with ammonia and crystallized from alcohol forms colorless needles, which melts at 121° C. (249.8° F.). Incinerated on platinum, it leaves no weighable residue.

It is incompatible with alkalis and their carbonates and the

usual alkaloidal reagents. Glass vessels should be avoided in preparing the solution, porcelain being used instead.

Actions and Uses.—Holocaine hydrochloride is a local anesthetic like cocaine, but having the advantage of a quicker effect and an antiseptic action. Five minims of a 1 per cent. solution when instilled into the eye are usually sufficient to cause anesthesia in from 1 to 10 minutes. It is said not to cause the scaliness of the cornea which sometimes results after the use of the older remedy.

Dosage.—It is applied in a 1 per cent. aqueous solution prepared in porcelain vessels.

Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a.M., Germany (Farbwerke Hoechst Co., New York). German patents Nos. 79,868, 80,568.

HOMATROPINE HYDROCHLORIDE.—Homatropinæ Hydrochloridum.—Homatropine hydrochloride, $C_{16}H_{21}NO_3HCl$, is the hydrochloride of the alkaloid homatropine, obtained by the condensation of tropine and mandelic acid.

Homatropine hydrochloride occurs as small white crystals, soluble in water and alcohol and melting at 216° to 217° C. (420.8° to 422.6° F.).

If sulphuric acid containing a trace of potassium dichromate be added to a crystal of the salt an evanescent pink color will be produced which rapidly changes to green. If 0.01 Gm. of the salt be added to 5 drops of nitric acid and evaporated to dryness in a porcelain dish the residue should not acquire a violet red color upon the addition of a few drops of alcoholic potassium hydroxide test solution (absence of atropine, hyoscyamine or hyoscyne). If 1 Cc. of an aqueous solution of the salt (1 to 100), be made alkaline with ammonia water, shaken out with chloroform and the chloroformic solution evaporated to dryness, the residue should turn yellow and finally brick red when warmed with about 1.5 Cc. of a solution of 1 part mercuric chloride in 30 parts of a mixture of 5 volumes alcohol and 3 of water (absence of most other alkaloids except atropine and hyoscyamine). If to an aqueous solution containing 0.1 Gm. of the salt an excess of potassium hydroxide test solution be added, liquid extracted with ether and the latter evaporated spontaneously, the crystals which form should melt at 96° C. (204.8° F.).

Actions and Uses.—Homatropine is less poisonous than atropine, but the same symptoms are produced by it when exhibited in large doses.

The hydrochloride is used as a mydriatic in ophthalmic surgery. The mydriatic effect begins in one-fourth to one-half hour and reaches a maximum in one hour and disappears in thirty-six to forty-eight hours. Accommodation paresis ceases earlier.

Homatropine hydrochloride is given for the same indications as the hydrobromide, but has no advantage over the latter.

Dosage.—It is applied to the eye in 1 per cent. solution.

ICHTHARGAN.—Argentī Ichthosulphonas.—Silver Sulphichylolate—Silver Ichthyolate.—A compound of ichthylol and silver claimed to contain 30 per cent. of metallic silver and 15 per cent. of sulphur in organic combination.

It is prepared, according to the patent specifications, by neutralization of ichthylol sulphonic acid with silver oxide and extracting the water soluble silver ichthylol sulphonate.

It is a brown, amorphous, perfectly stable powder, having a faint chocolate-like odor. It is freely soluble in water, glycerin, or diluted alcohol, but insoluble in absolute alcohol, ether or chloroform. Its aqueous solution darkens with precipitation of metallic silver when exposed to the light, but is said to suffer no change in amber-colored bottles.

It is incompatible with the soluble chlorides. Its solutions should not be exposed to the light.

Actions and Uses.—Ichthargan is said to be bactericide, astringent and antiphlogistic. It is reported to combine the bactericidal action of the silver salt with the penetrating and antiphlogistic action of ichthyol.

It is said to be useful in gonorrhea in all its forms as a succedaneum for organic salts of silver. It is claimed to be the strongest in silver content of all the various organic compounds of silver introduced in late years.

Dosage.—From 0.004 to 0.2 per cent. solution in gonorrhea; 3 per cent. solution in posterior urethritis; 0.5 to 3 per cent. solution in trachoma.

Manufactured by the Ichthyol Co., Hamburg, Germany (Merck & Co., New York). German patent No. 112,630. U. S. trademark No. 33,363.

ICHTHOFORM.—Ichthyol Formaldehyde.—A compound of ichthyol and formaldehyde.

It is a dark brown, practically odorless and tasteless powder. It is permanent and insoluble in the usual solvents.

Actions and Uses.—Ichthoform is said to be antiseptic and antiphlogistic. It is reported to be efficacious in arresting intestinal decomposition and inflammation, and to be non-toxic. (See note under Beta-naphthol Benzoate and under Creosote Carbonate.)

It is recommended by the manufacturer locally in endometritis, in ozena, and in wounds, ulcers, etc.

Dosage.—Internally, from 0.6 to 2 Gm. (10 to 30 grains), in powders taken plain, or suspended in gruel or cacao, or as a "shake" mixture; externally as pure powder, as 30 to 50 per cent. triturations, or as 10 to 25 per cent. ointments.

Manufactured by the Ichthyol Co., Hamburg, Germany (Merck & Co., New York). German patent No. 107,233. U. S. trademark No. 33,349.

IODIPIN.—Iodized Sesame Oil.—Iodipin is an iodine addition product of sesame oil.

It is prepared by the action of iodine chloride on sesame oil in sufficient quantity, theoretically calculated, to produce the required iodization.

It is a yellow, oily liquid, having a purely oleaginous taste. It is insoluble in water.

If to 1 Cc. of Iodipin in 10 Cc. of chloroform a few drops of phenolphthalein test solution are added, the addition of one drop of half normal potassium hydroxide V. S. should produce a red color (limit of acidity).

If Iodipin be treated as given below, and titrated with tenth-normal thiosulphate solution, each Cc. thiosulphate consumed will indicate the presence of 0.01259 Gm. iodine (I); 3 Gm. of Iodipin, 10 per cent., or 1 Gm. of Iodipin, 25 per cent. are saponified by heat with 5 Gm. of potassium hydroxide and 25 Cc. of alcohol. The solution is evaporated to dryness on the water bath and the residue carefully incinerated. The residue is extracted with water and washings filtered into a Topp distilling apparatus. Then 10 Cc.

of hydrochloric acid and 10 Cc. of ferric chloride solution are added and the liberated iodine distilled with the usual precautions into a solution of potassium iodide. Finally the iodine is determined by titration with tenth-normal sodium thiosulphate solution V. S., and the per cent. of iodine calculated.

Actions and Uses.—Iodipin acts in the system similarly to the iodides, being broken up in a manner analogous to that described under bromipin, which see. Its action is claimed to be more lasting than that of the iodides and iodism is less likely to be caused.

Dosage.—From 2 to 6 Cc. (30 to 90 minims) of iodipin, 25 per cent. hypodermically or from 4 to 8 Cc. (1 to 2 fluidrams) of iodipin 10 per cent. three or four times a day.

Manufactured by E. Merck, Darmstadt, Germany (E. Merck & Co., New York). German patent No. 96,495.

Iodipin, 10 per cent.—Iodized sesame oil, 10 per cent. iodine. Iodipin 10 per cent. is an iodized sesame oil containing 10 per cent. of iodine in organic combination.

Iodipin, 25 per cent.—Iodized sesame oil, 25 per cent. iodine. Iodipin 25 per cent. is a preparation similar to the preceding, but intended for hypodermic administration.

Capsules of Iodipin, 25 per cent.—Each capsule contains iodipin, 25 per cent. 2 Gm. (20 grains).

ISATOPHAN.—Isatophan is methoxy-atophan, 8-methoxy-2-phenyl-quinolin-4-carboxylic acid, $\text{CH}_3\text{O.C}_7\text{H}_4\text{N.C}_6\text{H}_5.\text{COOH}$, 8:2:4.

8-methoxy-2-phenyl-quinolin-4-carboxylic acid was described by Doebner (Annalen der Chemie, Liebig, Vol. 249, p. 107), who prepared it by warming together pyroracemic acid, benzaldehyde and ortho-anisidin in alcohol.

Isatophan is a lemon-yellow crystalline powder melting at 216°C ., soluble in alcohol and alkalis but insoluble in water or ether. It is tasteless and possesses a slight odor resembling atophan.

If isatophan be dissolved in concentrated sulphuric acid, an orange colored solution results, which yields a yellow precipitate on the addition of bromine water.

If ferric chloride be added to an alcoholic solution of isatophan, a reddish-brown color is produced.

If isatophan be heated above its melting point, carbon dioxide is liberated and methoxy-phenyl-quinolin, a yellow oil, is produced.

Actions and Uses.—Same as for Atophan, but it is tasteless.

Dosage.—Same as for Atophan.

Manufactured by the Chemische Fabrik auf Actien, vorm. E. Schering, Berlin, Germany (Schering & Glatz, New York). No U. S. patent or trademark.

Isatophan Tablets.—Each tablet contains isatophan 0.5 Gm. (7½ grains).

LACTIC ACID FERMENTS.

BACILLARY MILK.—Bacillary milk is a sterilized fat-free milk fermented by the action of a pure culture of *Bacillus bulgaricus* and contains over 2 per cent. of lactic acid.

Bacillary milk is said to contain the Bulgarian bacilli in pure culture and has the marked acidity characteristic of milk soured by the oriental milk-souring bacilli and is free from sliminess or bitterness. It is said that in a cold place it may be kept for a long time without impairment of its qualities.

Actions and Uses.—Bacillary milk is used as a means for the administration of the Bulgarian bacillus and for its lactic acid as well as for its nutritive value.

Dosage.—When the acidity is distasteful the portion of the milk directed to be taken may be rendered palatable by mixture with milk or water or by addition of sugar. Bacillary milk is put up in glass bottles, each containing 1 pint and should be kept on ice.

Manufactured by Fairchild Bros. & Foster, New York. Not patented or trademarked.

BULGARA TABLETS.—Tablets containing a practically pure culture of *Bacillus bulgaricus*.

Bulgara tablets consist of the slowly dried cultures mixed with milk sugar and starch, each tablet weighing 5 grains and containing a sufficient number of virile organisms to effect the souring of a pint of sterile milk in less than 20 hours.

Actions and Uses.—The bacilli contained in bulgara tablets give rise to the production of considerable quantities of lactic acid which tends to restrain the growth of putrefactive organisms. They are said to be useful in diseases of the alimentary tract and in such general diseases as are believed to depend on putrefaction in the intestines.

Dosage.—One or two tablets before or after meals. The diet should contain a sufficiency of sugar.

Bulgara tablets are marketed in tubes, each containing fifty tablets, with an expiring date stamped on the label.

Manufactured by Hynson, Westcott & Co., Baltimore, Md. Not patented or trademarked.

KEFIR FUNGI.—Kefir fungi is a mixture of bacteria and yeasts capable of causing lactic acid fermentation of milk.

Kefir occurs in the form of white irregular roundish bodies of the size of a walnut, with a very rough, furrowed surface, and of a tough gelatinous consistency. The substance contains *Saccharomyces cerevisiae* (Heyden), *Bacillus acidilactici* (Pasteur), *Dispora Caucasica* (Kern). It acts on milk as follows: Fat, salt and water of the milk remain unaffected. The lactose is gradually decreased and the lactic acid increased. Alcohol is produced along with carbon dioxide; 10 per cent. of the casein is converted into acid albumin and peptones, 10 per cent. into hemialbumose and the rest loses its lime. (U. S. Disp., edit. 19, p. 1540.)

Actions and Uses.—Kefir fungi is used for the preparation of fermented milk which contains lactic acid, alcohol, the fats, salt and water of the milk. Kefir milk acts as an easily digestible food in many cases of dyspepsia and lack of digestive power. It is also serviceable in some cases in the prevention of intestinal putrefaction.

Dosage.—Kefir kumyss may be prepared by adding active kefir grains to fresh cows' milk, kept at a temperature of 21° to 27° C. (70° to 80° F.) until the effect of fermentation becomes apparent by the rising of the grains to the surface. The grains may then be strained off, and the milk, which now contains sufficient yeast-cells to insure continuance of the fermentation, left to itself in well-corked bottles.

LACTAMPOULE.—Lactampoule is a pure culture in ampoules, of the selected *Bacillus bulgaricus*, each ampoule containing about 12 Cc.

The bacilli are obtained by the usual bacteriologic method, the growth of the bacilli on modified Cohendy peptone-sugar-broth medium.

Actions and Uses.—Lactampoules are designed to afford a pure culture of the Bulgarian bacilli for the inoculation of milk or other cul-

ture medium, or for direct application in the treatment of affections of the body cavities.

Dosage.—The ampoules must be kept in a cold place and are not guaranteed beyond the date stamped on the package.

Manufactured by Fairchild Bros. & Foster, New York. Not patented or trademarked.

LACTIC BACILLARY TABLETS—Fairchild.—Lactic bacillary tablets—Fairchild are tablets said to be made from a practically pure culture of the *Bacillus bulgaricus*.

The culture of the Bulgarian bacillus is obtained by inoculation and incubation on modified Cohendy peptone-sugar broth medium. This culture is reduced to a pulverulent form by the addition of sterile lactose, desiccated and compressed. The tablet is friable and contains an abundance of the true Bulgarian lactic acid bacterium.

In the standardization of this product, one tablet is placed under aseptic precautions, in 100 Cc. of carefully sterilized centrifuged milk in a sterile flask and kept in the thermostat for forty-eight hours at 40° C.

After incubation for about twenty-four hours the milk should form a coagulum with some slight separation of serum; after about forty-eight hours the milk develops the acidity, about 2 per cent. actual lactic acid, characteristic of the Bulgarian sour milk; and under the microscope shows abundance of the Bulgarian bacilli. This fermented milk by vigorous agitation forms a homogeneous thick fluid, of a marked sour taste, free from bitterness, or sliminess, or objectionable physical characteristics.

Actions and Uses.—The lactic bacillary tablets are designed for internal administration in the treatment of intestinal fermentative diseases by the Bulgarian bacilli, with the design of accomplishing the acclimation of the bacilli in the alimentary tract, so as to secure their characteristic action against putrefactive fermentation by the production of lactic acid.

Dosage.—One or two tablets are given before or after meals. The diet should not contain an excess of proteid, but should afford sufficient sugar. The tablets should be kept in a cold place and should not be used after the date given on the label.

Manufactured by Fairchild Brothers & Foster, New York. No U. S. patents or trademarks.

MASSOLIN.—*Cultura Bacilli Bulgarici—Lederle.*—Massolin is a pure culture of the *Bacillus bulgaricus* of Massol, grown on one of the following media: Calcium carbonate lactose broth, calcium carbonate dextrose broth, calcium carbonate Cohendy broth, or Cohendy broth.

The material for one of the above broths is sterilized for thirty minutes on three successive days and then placed in the incubator for at least forty-eight hours to determine its sterility before using. The material is then put into large flasks, inoculated from test tube cultures of the bacillus and incubated at 37° C. (98.5° F.) for from twenty-four to ninety-six hours. It is then tested to see that it is free from contaminating organisms.

The preparation is of an amber color and has the odor and taste of the particular medium employed as its base.

The material should be inoculated into milk and into the above media in test tubes and smeared on Cohendy agar. The cultures should be examined microscopically for the detection of contaminating organisms.

Actions and Uses.—The culture tends to prevent the growth of putrefactive and pathogenic organisms. It is said to be useful in the treatment of suppurative conditions and is said to have been found especially beneficial in atrophic rhinitis, chronic nasal catarrh, inflammations of the frontal sinus, antrum, ethmoidal cells, middle ear, etc.

Dosage.—The culture should be liberally applied directly to the diseased area and in ordinary nose and throat affections the contents of one bottle, 7.5 Gm. ($\frac{3}{4}$ ounce), may be employed at each treatment.

Manufactured by Lederle Antitoxin Laboratories, New York (Schleffelin & Co., New York). No patent or trademark. U. S. government license No. 17.

LECITHIN PREPARATIONS.

LECITHIN.—Lecithin consists of the esters of oleic, stearic, palmitic or other fatty acids with glycerophosphoric acid combined with cholin; occurring in combination with proteids in many animal and vegetable tissues, especially in nervous matter and egg-yolk.

Lecithin is best prepared from egg-yolk (in which it exists as vitellin) by dissolving out the lecithin by strong alcohol.

It is a yellowish-brown, waxy solid of peculiar odor, soluble in an equal volume of cold absolute alcohol, readily soluble in chloroform, petroleum, benzoin and fats, less readily in ether. It is insoluble in water, but swells, giving the peculiar "myeline forms," and decomposes on prolonged contact. It is hygroscopic on exposure to air.

The alcoholic solution is precipitated by platinum or cadmium chloride. It is decomposed by alkalies with the formation of cholin and trimethylamine. The ash contains phosphoric acid. The different lecithins contain from 3.84 to 4.12 per cent. of phosphorous and 1.73 to 1.86 per cent. of nitrogen. The ratio of nitrogen to phosphorous should be as 1 to 2.21.

Lecithin is incompatible with alkalies; it should be kept in well-stoppered bottles and should be protected from the light.

Actions and Uses.—Lecithin is supposed to act as a stimulant to nutrition and not as a direct nutrient, and to increase the number of the red blood-corpuscles and the amount of hemoglobin. Some investigators state that there is a slight increase in the proportion of large mononuclear leukocytes, that the appetite is improved, that there is a retention of nitrogen and a diminution in the excretion of phosphoric and sulphuric acids, indicating a storage of proteids, and that uric acid is perhaps slightly diminished. Lecithin, even in large doses, is not toxic. (See note under Creosote Carbonate.)

The ordinary diet contains from 5 to 15 Gm. (75 to 225 grains), and some observers claim that the benefits of the administration of lecithin can be obtained by an increased use of lecithin-containing food (eggs, etc.), but others claim that the raw or combined lecithin is ineffective.

Dosage.—It may be given by mouth in doses of from 0.1 to 0.5 Gm. (1.5 to 8 grains) per day, in pill form, before meals, or, hypodermically 1 Cc. (15 minims) of a 5 per cent. solution in oil, daily. Infants, one-third of these doses.

LECITHIN SOLUTION.—A solution of lecithin containing 1.6 Gm. of lecithin in 100 Cc. of a glycerine-alcoholic menstruum containing 18.5 per cent. of alcohol by volume.

Actions and Uses.—See Lecithin.

Dosage.—4 Cc. (1 fluidram), containing 0.06 Gm. (1 grain) of lecithin.

Manufactured by Fairchild Bros. & Foster, New York. Not patented or trademarked.

MEDICINAL FOODS.

The so-called "Liquid Foods," "Medicinal Foods," or "Predigested Foods," as found on the market, are solutions containing as the essential constituents small amounts of protein substances and carbohydrates, preserved by alcohol.

The protein substances should be rendered soluble by means of enzymes or by some process which will ensure the formation of nutritious and non-toxic products. While the hydrolysis of proteins to soluble proteoses may also be effected by means of acids or superheated steam, these products should be used as medicinal foods only when their composition and behavior is known, since dangerous toxic symptoms have been reported from the use of mixtures obtained in this way. The protein content of these liquid medicinal foods (obtained by multiplying the total nitrogen content by 6.25) ranges from 0.5 to more than 6 per cent. The carbohydrates present in these foods are sucrose (cane sugar), maltose, glucose, invert sugar, dextrin and possibly also lactose (milk sugar). In these foods, as found on the market, the quantity of carbohydrates ranges from 0.55 to more than 15 per cent. The alcohol content varies from 12.0 to 19 per cent. of absolute alcohol by weight. Some contain large amounts of glycerin.

Actions and Uses.—The value of medicinal foods depends on the proteins and carbohydrates contained therein. Glycerin does not, so far as known at present, possess any recognized food value, although there are a number of experiments on record to indicate that it influences metabolism. While the value of alcohol in the treatment of disease is fully appreciated, its value as a food product, pure and simple, in disease is an open question. It probably acts as a saver of fat and carbohydrate, but not as a tissue builder. The nutritive value of these medicinal foods, therefore, should be considered as based on their carbohydrate and protein content, exclusive of alcohol or glycerin. The calculated food value of a considerable number of medicinal foods, on the basis of the potential energy (calorific value) due to proteins and carbohydrates shows that some possess but one-sixth the value of milk, while the best have a trifle greater calorific value. The Council has decided that no liquid medicinal or predigested food be given consideration which contains less nutritive value, exclusive of alcohol and glycerin, than milk; and at least one-fourth of this should reside in nitrogenous constituents.

Dosage.—None of the commercial liquid medicinal or predigested foods contains sufficient food material to maintain normal nutrition. A man doing moderate work requires an amount of food which furnishes energy to 3,000 calories per day, and while, in sickness, this amount is not required, it should not fall much below 1,500 calories per twenty-four hours. The examination of commercial liquid food shows that the average daily dose recommended supplies from 10 to 111 calories based on protein and carbohydrate. To sustain the vitality of a patient during a serious illness, 2,000 Cc. of milk, giving about 1,480 calories, are required; to supply the same number of calories, even if the alcohol is considered to have direct food value, from 700 to 1,500 Cc. of the medicinal foods will be required. In many cases the amount of alcohol exhibited by these quantities would keep the patient in an alcoholic stupor continually. It should, therefore, be remembered that the patient is receiving a starvation diet when these preparations are given in ordinary doses. Unless the daily dose advised contains at least 100 calories, exclusive of alcohol and glycerol, a preparation should

not be depended on as of noteworthy importance in helping to sustain life even for a very limited period.

CASOID DIABETIC FLOUR.—Casoid diabetic flour is a mixture of the albuminoids of wheat (gluten) and of milk (casein), having approximately the following composition: Proteins, 84.5; fat, 1.4; mineral matter, 2.5; cellular fiber, etc., 0.7; water, 10.8.

The milk albuminoids (casein) are obtained from milk by the usual precipitation process; the wheat albuminoids are obtained by washing wheat flour and the two are then mixed.

The preparation is white, flaky, free from odor and has very little taste.

Actions and Uses.—This flour is employed in cases in which carbohydrates are contra-indicated, such as diabetes, amylaceous dyspepsia, etc.

The nutritive value of 500 Gm. of casoid diabetic flour corresponds to 1798.48 calories, of which 1753.48 are due to protein and 65 to fat. The same quantity of milk represents 360 calories, of which 84 are due to protein and 177.6 to fat.

Manufactured by Callard, Stewart & Watt, Ltd., London, England (Thomas Leeming & Co., New York). No U. S. patent. U. S. trademark No. 238,836.

CLOSE.—Close is stated to be a dry, completely soluble protein product of beef, separated from extractives and containing from 83 per cent. to 85 per cent. actual protein.

In the preparation of close the minced washed fiber of fresh raw beef is subjected to digestion under the action of an extract of the fresh gastric gland and under conditions of time, temperature and reactions approximating to those of bodily digestion; the solution thereby obtained is sterilized by boiling and then filtered, and by this means the solution is freed from enzymes and from coagulable substances, and reduced to dryness in vacuo.

Close occurs in light, yellowish-white scales. It is easily soluble in water, forming a solution having a faintly acid reaction.

Actions and Uses.—The nutritive value of 500 Gm. of close corresponds approximately to 2,500 calories. The same quantity of milk represents 360 calories, of which 84 are due to protein and 89.4 to carbohydrates. Close is especially designed as a means of augmenting the protein of any desired diet. It may be added to soups and broths of beef, chicken, cereals, vegetables, etc., at the moment of taking; it may also be added to any prepared food, the protein of which it is desired to raise; or given in wine. It may be taken in hot water with the addition of salt, pepper, celery or any other condiment.

Manufactured by Fairchild Bros. & Foster, New York. U. S. trademark No. 47,774. Not patented in U. S.

DEXTRI-MALTOSE, Mead's.—Mead's dextrin-maltose is said to contain approximately: maltose 52.0 per cent., dextrin 41.7 per cent., sodium chloride 2.0 per cent. and moisture 4.3 per cent.

It is prepared by the action of diastase on starch.

Mead's dextrin-maltose is a pale yellowish-white, granular, odorless powder, having a faintly sweetish taste. It is somewhat deliquescent on exposure to the air. It is soluble in water.

If a few drops of iodine test solution be added to an aqueous solution of Mead's dextrin-maltose (1 to 10) a reddish violet but not a blue color should be produced.

The maltose in Mead's dextrin-maltose is determined by the Fehling volumetric method as described in Leach's "Food Inspection

and Analysis," Ed. 2, p. 591, but instead of the factor there given the Fehling's solution is standardized against a 0.5 per cent. solution of maltose.

Actions and Uses.—On the claim that maltose is more readily assimilated than other forms of sugar, Mead's Dextri-Maltose is proposed to supplement the carbohydrate deficiency of cows' milk. The nutritive value of 500 Gm. of dextri-maltose corresponds to approximately 1,850 calories. The same quantity of milk represents 360 calories.

Dosage.—It may be used in all milk mixtures in the same proportions—by weight—as sugar or milk—i. e., 1 ounce of Mead's dextri-maltose (2 tablespoonfuls) to a 20-ounce mixture.

Manufactured by Mead, Johnson & Co., Jersey City, N. J. Not patented or trademarked.

DRY PEPTONIDS.—Dry peptonoids is stated to contain 40 per cent. of proteins and 53 per cent. of carbohydrates.

It is said to be made from beef, milk and wheat, by digesting the protein with pepsin and pancreatin and the carbohydrates with pancreatin and malt diastase. The resultant solutions are assayed, mixed in proper proportions and, the acid used in the digestion having been neutralized, concentrated in vacuo, sterilized, dried and brought to uniform composition by the addition of milk sugar. It consists of light brown granules of pleasant odor and taste and is very soluble in water and other fluid media.

Actions and Uses.—See Medicinal Foods. The nutritive value of 500 Gm. of dry peptonoids corresponds to approximately 2,000 calories, of which 870 are due to protein and 1,130 to carbohydrates and fat. The largest dose usually given (16 Gm.) equals, therefore, almost 64 calories. It is claimed to be especially useful for nutrient enemata.

Dosage.—For an adult from 8 to 16 Gm. ($\frac{1}{4}$ to $\frac{1}{2}$ ounce), taken in water, milk, wine, broths, soups, etc., also in gruels, in which case it should first be dissolved in a small quantity of water.

Manufactured by the Arlington Chemical Co., Yonkers, N. Y. U. S. trademark. October 17, 1882.

PANOPEPTON.—Panopepton contains 6.33 to 6.38 per cent. of nitrogenous matter (nitrogen \times 6.25), 10.05 to 11.92 per cent. of carbohydrates and 17 to 20.9 per cent. alcohol by volume (15 to 18.5 per cent. by weight).

It is said to be prepared from beef and wheat by digestion with gastric and pancreatic juices. The substance obtained by the digestion is mixed in fixed proportion of protein and carbohydrate, sterilized, concentrated in vacuo and dissolved in fortified Spanish sherry wine.

It is a light brown fluid, acid in reaction and possessing largely the odor and taste of sherry wine. Its specific gravity is 1.063 to 1.023.

Actions and Uses.—See Medicinal Foods. The nutritive value of 500 Gm. of Panopepton corresponds to 359.1 to 396.3 calories, of which 151.9 to 153.1 are due to protein and 244.4 to 206 to carbohydrates. The same quantity of milk represents 360 calories, of which 84 are due to protein, 98.4 to carbohydrates and the rest to fats.

Dosage.—From 8 to 16 Cc. (2 to 4 fluidrams) several times a day and at bedtime; for infants from a few drops to 2 Cc. (30 minims).

Manufactured by Fairchild Bros. & Foster, New York. U. S. trademark.

ESSENCE OF PEPSIN-Fairchild.—A solution of the milk-curdling and proteolytic ferments of the gastric glands in a menstruum containing 18.5 per cent. of alcohol by volume.

The solution is prepared by direct extraction from the peptic glands of the stomach.

One Cc. will curdle 250 Cc. of milk at 39° C. in a few minutes, and dissolve 50 Gm. of coagulated egg albumin when tested according to the directions of the United States Pharmacopœia.

Actions and Uses.—Essence of pepsin has the action of rennin and of pepsin and is recommended by the manufacturers for preparing milk and in cases in which pepsin is indicated.

Dosage.—4 Cc. (1 fluidram) or more.

Manufactured by Fairchild Bros. & Foster, New York.

MERCURIC CYANIDE.—Hydrargyri Cyanidum.—Hydrargyrum cyanatum (Pharm. Française, 1908); Mercuric cyanide, Hg. (CN)₂, is the mercuric salt of hydrocyanic acid.

Prussian blue and mercuric oxide in water are boiled until the mixture is brown; the mixture is filtered, acidified with hydrocyanic acid, evaporated and allowed to crystallize in a cool place. It is also prepared by the action of hydrocyanic acid on mercuric chloride. Colorless or white, prismatic crystals, odorless and having a bitter, metallic taste (the salt is exceedingly poisonous). It is darkened on exposure to light. Soluble at 15° C. (59° F.) in 12.8 parts of water and in 15 parts of alcohol, in 3 parts of boiling water and in 6 parts of boiling alcohol; very sparingly soluble in ether.

When slowly heated in a glass tube the salt decrepitates and decomposes into metallic mercury and inflammable cyanogen gas, which burns with a purple flame. On further heating the blackish residue, consisting of para-cyanogen with globules of metallic mercury, is wholly dissipated.

If 1 part of the salt be gently heated with 1 part of iodine in a dry test-tube it will produce at first a yellow sublimate, which afterward becomes red, and above this a sublimate of colorless, needle-shaped crystals.

On adding hydrochloric acid to the aqueous solution of the salt the odor of hydrocyanic acid is evolved.

A 5 per cent. aqueous solution of the salt should be neutral to litmus paper and should not yield, on the gradual addition of a few drops of potassium iodide test solution, either a red or a reddish precipitate, soluble in an excess of the precipitant, nor should it yield a white precipitate with silver nitrate test solution (absence of mercuric chloride).

If mercury cyanide be dissolved in an aqueous solution of sodium chloride the addition of phenolphthalein to this solution should produce no red coloration (absence of mercuric oxide).

Ammonia should not color an aqueous solution blue (absence of copper) nor should a solution of copper give a brown color or precipitate (absence of potassium ferrocyanide). The presence of large quantities of potassium sulphate may be demonstrated by igniting, leaching the ash and testing the filtrate with barium. Dilute sulphuric acid should not liberate hydrocyanic acid (absence of potassium cyanide). Ammonia should dissolve mercuric cyanide without producing a white precipitate (absence of oxycyanide). (Pharm. Française, 1908.)

Actions and Uses.—Mercuric cyanide has been reported to be as actively antiseptic as mercuric chloride and to be less irritating; but this has been questioned. It is used locally and internally like mercuric chloride.

Dosage.—Internally from 0.004 to 0.008 Gm. (1/16 to 1/8 grain); locally, solutions of from 1-4000 to 1-2000 may be used for applications to the eye or mucous membranes; from 25 to 35 minims of a 1 per

cent. solution may be used hypodermically without causing local irritation. Death has occurred from the use of a vaginal injection containing 0.9 Gm. (14 grains) of mercuric cyanide.

In diphtheria and croup it is used in 0.01 per cent. solution as a gargle or internally in doses of 0.0005 Gm. to 0.001 Gm. (0.0077 to 0.0154 grain). In fibrinous rhinitis it is used on a tampon in 0.04 per cent. solution.

MERCURIC SALICYLATE.—Hydrargyri Salicylas.—Hydrargyrum Salicylicum (Pharm. Germanica, edit. 4; Pharm. Helvetica, edit. 4).

Mercuric salicylate, $\text{Hg.C}_6\text{H}_4\text{O.COO.}$, is a mercuric salt of salicylic acid in which one atom of mercury has combined with one molecule of salicylic acid by replacing the hydrogen atoms of the phenolic hydroxyl and carboxyl groups.

Mercuric salicylate may be prepared by precipitating the mercuric oxide from 27 parts of mercuric chloride as directed in the case of hydrargyri oxidum flavum, washing, placing in a flask with a little water and 15 parts of salicylic acid, and heating on a water-bath with agitation until the mixture is perfectly white. Collect the precipitate, wash until free from acid, dry at 30° to 40° C. (86° - 104° F.), and finally at 100° C. (212° F.).

Mercuric salicylate occurs as a white amorphous powder, tasteless, odorless and neutral to litmus paper, slightly soluble in water or alcohol, but soluble at the ordinary temperature in solutions of sodium hydroxide and sodium carbonate with formation of a double salt. From these solutions it is reprecipitated by acids. It is soluble also in warm solutions of chlorides, bromides and iodides. On ignition it is entirely volatilized. Strong mineral acids decompose it, especially on heating, and after this decomposition hydrogen sulphide precipitates black mercuric sulphide from the solution.

When shaken with water the resulting solution gives a violet coloration with ferric chloride.

An aqueous solution of mercuric salicylate is not precipitated or colored immediately by hydrogen sulphide or ammonium sulphide.

0.1 Gm. of mercuric salicylate heated in a small tube with a small crystal of iodine produces the characteristic orange to red colored mercuric iodide.

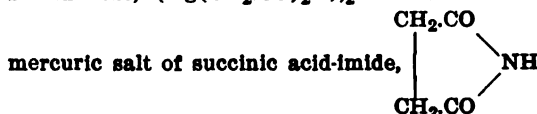
If 0.3 Gm. to 0.5 Gm. mercuric salicylate be weighed and dissolved in 100 Cc. water containing 3 Gm. sodium chloride, the solution diluted to 400 Cc., acidified with hydrochloric acid and saturated with hydrogen sulphide, the weight of the resulting mercuric sulphide, after filtering, washing and drying, should indicate the presence of not less than 96.7 per cent. mercuric salicylate. Each gram of mercuric sulphide found is equivalent to 1.4518 Gm. mercuric salicylate ($\text{Hg.C}_6\text{H}_4\text{O.COO.}$).

Action and Uses.—Antiseptic and antisyphilitic. It has been stated that it is well tolerated by the stomach and that it does not produce salivation, but it may produce some gastro-intestinal irritation occasionally, even when used hypodermically. The lack of salivation is probably due to its insolubility and slow absorption and not to any peculiarity of its effects. It is used as a disinfectant and as a remedy in syphilis and in certain skin diseases.

Dosage.—From 0.003 to 0.008 Gm. ($1/20$ to $1/8$ grain). For hypodermic injections a suspension in liquid paraffin, 1 part in 10, is used; before injecting the mixture must be well shaken in order that the insoluble salt may not remain at the bottom. The needle and syringe should be thoroughly cleansed after each injection, as the insoluble drug readily clogs the instrument. At first, 0.65 Cc. (10 minims) of the mixture described should be injected deeply into the gluteal region every fourth day and this may be increased to every second day if no symptomatic evidences of the action of the drug appear. It is used in the form of dusting powder and ointment (1 in 10). A suspension

in a mucilaginous vehicle (1 in 300) is used as an injection in gonorrhea, 1 Cc. (15 minims) being injected at a time. As a disinfectant the salicylate is as powerful as mercuric chloride, its great drawback being its insolubility; in order to overcome this difficulty the following formula has been devised: Mercuric chloride, 1 part; sodium salicylate, 3 parts; dissolved in distilled water, 100 parts.

MERCURIC SUCCINIMIDE.—Hydrargyri Succinimidum.—Mercury succinimide, $(\text{Hg}(\text{CH}_2\text{CO})_2\text{N})_2$ is the



Mercury succinimide may be prepared by dissolving freshly precipitated mercuric oxide in warm aqueous solution of succinimide and evaporating the mixture, which then deposits crystalline needles. (Schmidt's Pharm. Chemie, Vol. II, pt. I, p. 482.) It may also be prepared by adding an alcoholic solution of succinimide containing a few drops of ammonia to an ethereal solution of mercuric chloride (Proceedings A. Ph. A., Vol. 40, p. 1029).

Mercury succinimide is a white crystalline powder, soluble in 25 parts hot water and in 75 parts cold water, and in 300 parts of alcohol. It is very stable in solution. The aqueous solution is not affected by albumin. Mercury succinimide should be protected from light. Toward hydrogen sulphide and potassium iodide it reacts as an inorganic mercuric compound. Addition of sodium hydroxide to an aqueous solution of mercuric succinimide produces a yellowish-white precipitate, which on heating is reduced to metallic mercury. If mercuric succinimide is heated with five times its bulk of zinc dust, pyrrol is given off, which may be recognized by the red color which is developed when a pine shaving moistened with hydrochloric acid is held in its vapors.

The aqueous solution must be neutral and should not be affected by solutions of silver nitrate or egg albumin (absence of mercuric chloride and other mercuric salts).

On ignition it should volatilize completely, leaving no residue. If one gram is shaken with 10 Cc. of dry ether, the liquid filtered and the ether removed by evaporation, no residue should remain. If one gram is suspended in ether and hydrogen sulphide passed through the mixture for some time, the mercury succinimide will be decomposed, the mercury being precipitated as mercuric sulphide. If the ether be filtered from this precipitate, and evaporated, a residue of succinimide will remain which should have a melting point of 124-125° C.

Actions and Uses.—Mercuric succinimide has the action of other salts of mercury, but its solutions are said to be non-irritating. The preparation is used like other compounds of mercury in the treatment of syphilis.

Dosage.—Mercuric succinimide is used mainly by hypodermic injection, a 2.5 per cent. solution being employed. From 0.5 to 1 Cc. (8 to 16 minims) of this solution may be injected once daily. Mercuric succinimide may be given by the mouth in doses of 0.01 to 0.015 gm. ($\frac{1}{4}$ to $\frac{1}{4}$ grain).

Non-Proprietary Preparations:

Tablet Mercury Succinimide (Hypodermic) 1/5 grain.—Each tablet contains mercuric succinimide 0.013 Gm. (1/5 grain). Prepared by Burroughs, Wellcome & Co., London and New York.

Hypodermic Tablets Mercuric Succinimide 1/5 grain.—Each tablet contains mercuric succinimide 0.013 Gm. (1/5 grain). Prepared by Sharpe & Dohme, Baltimore, Md.

Hypodermic Tablets Mercuric Succinimide, 1/10 grain.—Each tablet contains mercuric succinimide 0.006 Gm. (1/10 grain). Prepared by Sharpe & Dohme, Baltimore, Md.

ETHYL-MORPHINE HYDROCHLORIDE.—*Morphinæ Æthylatæ Hydrochloridum.*—Ethyl-morphine hydrochloride, $(C_{17}H_{19}ON.O)O.(C_2H_5)HCl + H_2O$, is the hydrochloride of the ethyl ester of morphine.

The product was first introduced by Merck & Co., under the trade name dionin. It may be obtained by the action of ethyl iodide on morphine in the presence of alkali, the basic product being purified by crystallization from hot alcohol, dissolving the crystals in hydrochloric acid and crystallizing.

It is a white, microscopically crystalline powder, odorless and only slightly bitter. It is soluble in about 7 parts of water and in 2 parts of alcohol, insoluble in ether and in chloroform. It melts completely with decomposition at $125^{\circ} C.$ ($257^{\circ} F.$).

It gives the usual reactions for alkaloids. It is distinguished from morphine salts by its insolubility in excess of alkali, and by not producing an immediate blue color, but gradually developing a blue-green coloration, when its solution is added to dilute ferric chloride solution containing a fragment of potassium ferricyanide.

It is incompatible with alkalies and their carbonates and alkaloidal reagents, as potassium-mercuric iodide, tannic acid, picric acid, etc.

Actions and Uses.—It is claimed that this compound acts like morphine without producing constipation, nausea or lassitude. It is the conclusion of some good observers that it possesses no advantage over codeine. Applied to the eye, it causes a local vasodilatation, leading to acute conjunctival edema.

Ethyl-morphine hydrochloride is said to be useful to relieve pain, especially in respiratory affections, as an antispasmodic in whooping-cough, for insomnia and externally in the treatment of corneal affections, conjunctivitis, etc.

Dosage.—From 0.015 to 0.06 Gm. ($\frac{1}{4}$ to 1 grain). Externally it is applied in 10 to 20 per cent. solutions.

Proprietary Preparation:

DIONIN.—A name applied to ethyl-morphine-hydrochloride.

Manufactured by E. Merck, Darmstadt, Germany. (Merck & Co., New York). German patents Nos. 102,654, 107,225 and 108,075. U. S. trademark.

NOVOCAINE.—Novocaine is 1-para-aminobenzoyl-2-diethyl-aminoethane hydrochloride, $CH_2(C_6H_4.NH_2.COO).CH_2[N(C_2H_5)_2].HCl$, the monhydrochloride of para-aminobenzoyldiethyl-aminoethanol.

Novocaine crystallizes from alcohol in fine, colorless needles, which melt at $156^{\circ} C.$ ($312.8^{\circ} F.$). It is soluble in an equal weight of water, but requires 30 parts of alcohol. From the aqueous solution, which is neutral, alkali hydroxides and carbonates precipitate the free base in the form of a colorless oil, which soon congeals to a crystalline mass, but solution of sodium bicarbonate is miscible with solutions of novocaine without producing either precipitation or turbidity. The free base crystallizes from diluted alcohol with 2 molecules of water, but from ether or ligroin in the form of anhydrous shining prisms, which melt at 58° to $60^{\circ} C.$ (136.4° to $140^{\circ} F.$), while the hydrated base melts at $51^{\circ} C.$ ($123.8^{\circ} F.$).

The aqueous solution of the salt may be heated to boiling without decomposition, and remains perfectly clear when kept for days in loosely-stoppered vials. It gives precipitates even in very dilute solutions with the usual alkaloidal reagents, such as potassium mercuric-iodide, picric acid, potassium iodide, etc.

It is incompatible with alkalies and their carbonates and the alkaloidal reagents.

Actions and Uses.—Novocaine is a local anesthetic similar in action to cocaine, but said to be less toxic than other cocaine substitutes. When injected subcutaneously it is said to exert a prompt and powerful anesthetic action, but the effect is not sustained. This may be remedied by the simultaneous injection of suprarenal alkaloid. Novocaine is not irritant. (See note under Creosote Carbonate.)

It is said to be useful in all cases in which cocaine is indicated.

Dosage.—For infiltration anesthesia, solutions of 0.25 Gm. (4 grains) novocaine in 100 or 50 Gm. (3.2 or 1.6 ounces) physiologic salt solution, with 5 or 10 drops of epinephrine solution (1-1000); for instillations and injections, solutions of 0.1 Gm. (1½ grains) novocaine in 10 or 5 Gm. (150 or 75 grains) salt solution, with or without 10 drops of epinephrine solution (1-1000). In ophthalmology, 1 to 5 to 10 per cent. solution, in rhino-laryngology 5 to 20 per cent. solutions are recommended, with the addition of 6 to 8 drops of epinephrine solution (1-1000) to each 10 Cc. (160 minims). Internally, owing to its feeble toxicity, it may be given in doses up to 0.5 Gm. (7½ grains) to adults.

Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a.M., Germany (Farbwerke Hoechst Co., New York).

Hypodermic Tablets Novocaine, ½ grain.—Each tablet contains novocaine 0.020 Gm. (¼ grain).

Novocain Hypodermic Tablets "D."—Each tablet contains novocain 0.2 Gm. (3 grains).

Novocain Hypodermic Tablets "F."—Each tablet contains novocain 0.05 Gm. (¾ grain).

Novocain and L-Supracain Synthetic Hypodermic Tablets "A."—Each tablet contains novocain 0.125 Gm. (2 grains) and l-suprarenin synthetic 0.000083 Gm. (1/1000 grain).

Novocain and L-Supracain Synthetic Hypodermic Tablets "B."—Each tablet contains novocain 0.1 Gm. (1½ grains) and l-suprarenin synthetic 0.00025 Gm. (1/250 grain).

Novocain and L-Supracain Synthetic Hypodermic Tablets "C."—Each tablet contains novocain 0.05 Gm. (¾ grain) and l-suprarenin synthetic 0.000083 Gm. (1/1000 grain).

Novocain and L-Supracain Synthetic Hypodermic Tablets "E."—Each tablet contains novocain 0.02 Gm. (¼ grain) and l-suprarenin synthetic 0.00005 Gm. (1/1200 grain).

NOVOCAINE NITRATE.—Novocainæ Nitras.—Novocaine nitrate is, 1-para-aminobenzoyl-2-diethylamino-ethane nitrate, $C_6H_4.NH_2(COO.C_2H_5)_2.NHO$, the nitrate of p-aminobenzoyldiethylaminoethanol, the case contained in novocaine.

Novocaine nitrate occurs in small colorless and odorless crystals, soluble in water and alcohol. The aqueous solution is neutral in reaction. Melting point 100° - 102° C. (212° - 215° F.).

If 0.1 Gm. novocaine nitrate be dissolved in 1 Cc. concentrated sulphuric acid and a solution of ferrous sulphate carefully floated above it, a brown zone is formed at the surface of contact of the two solutions. 1 part novocaine nitrate dissolved in 10 parts water and acidified with nitric acid, should yield no precipitate upon the addition of silver nitrate solution.

Actions and Uses.—The same as for novocaine. It may be prescribed in combination with silver salts, with which it forms no precipitate.

Dosage.—Used in 3 per cent. solutions.

Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a.M., Germany (Farbwerke Hoechst Co., New York).

U. S. patent No. 812,554 (Feb. 13, 1906; expires 1923). Trademark No. 53,072.

NUCLEIN, NUCLEIC ACID AND NUCLEATES.

Nucleins are modified nucleoproteins obtained by peptic digestion or by treatment with dilute acids. They are split up by the action of alkalies or by tryptic digestion into a protein constituent and a nucleic acid. The exact composition of the protein and of the nucleic acid varies somewhat with the source of the nucleoprotein from which it is derived. The nucleic acids of commerce are apt to contain some protein in combination. They are most commonly made from yeast cells, but have been made, also, from the wheat embryo, the sperm of certain fishes and from the thymus and pancreas glands. In composition they approximate the formula: $C_{40}H_{52}N_{14}O_{25}P_4$. From the wheat embryo products with relatively more nitrogen have been obtained.

Nucleins are colorless, amorphous, insoluble in alcohol and ether and insoluble or slightly soluble in water. They are more or less readily dissolved by dilute alkalies. They give the biuret test and Millon's reaction. They show a great affinity for many dyes, taking them up from aqueous or alcoholic solutions. The term nuclein is sometimes used to designate an impure nucleic acid, which usage has led to confusion, as the nucleic acids are bodies of definite composition.

Both nucleins and nucleic acids yield metaphosphoric acid on incineration. On fusion with potassium nitrate and sodium carbonate they yield alkali phosphates.

Actions and Uses.—Nuclein and nucleic acid and nucleates are said to increase the number of white corpuscles, and it has been claimed that this increases the resistance to infections. These results have been obtained by intravenous or hypodermic injection, and on this basis therapeutic deductions have been made; it is doubtful whether we are warranted in applying these conclusions to the administration of the remedy by the mouth.

Nuclein and nucleic acid and nucleates have been used in tuberculosis and various infections, but their true value is undetermined.

They are transformed in the organism into purin compounds and may cause the amount of uric acid in the urine to be increased.

NUCLEIN.—*Nucleinum.*—Nuclein is a modified nucleoprotein obtained by peptic digestion or by treatment with dilute acids.

Actions and Uses.—See Nuclein, Nucleic Acid and Nucleates.

Dosage.—From 0.5 to 1 Gm. (8 to 15 grains) three times a day.

ORGANIC IRON PREPARATIONS.

The term, "organic iron" ("masked" or "non-ionic" iron), is confined by modern usage to those organic compounds of iron which do not give the chemical tests of this metal (blue color with potassium ferrocyanide, blue-black color with hematoxylin, etc.) until the structure of the molecule has been destroyed by reagents. The resistance to this destruction varies greatly; some iron compounds (such as hemoglobin) require incineration or the action of concentrated acids; while others give the iron-tests after treatment with even fairly dilute acids. The organic iron compounds occurring naturally in animal and vegetable tissues (which are often termed "food-irons") belong generally to the more resistant class, while the iron of the synthetic preparations is as a rule liberated fairly readily. This does not, however, constitute

a sharp line of distinction between the two classes, nor is there any good evidence that they differ in therapeutic action. Until a difference is demonstrated all organic iron preparations, whatever their source, may be placed in a single class. It is evident, however, that an organic iron (chemically) which is destroyed by 0.2 per cent. hydrochloric acid at the body temperature cannot be classed as an organic iron in the therapeutic sense. It should also be emphasized that salts of iron (which give the iron tests directly) are classed as inorganic iron, whatever the acid radical. True albuminates, peptones, etc., of iron are, therefore, inorganic.

Actions and Uses.—Organic iron preparations are used to increase the amount of hemoglobin in chlorosis and anemic conditions. Bunge supposed that only organic iron could be absorbed and assimilated by the body, the reputed action of inorganic iron being altogether indirect, and due to its local effects on the alimentary canal. This theory was modified by Abderhalden, to the effect that inorganic iron, while it could not be converted into hemoglobin, nevertheless stimulated the assimilation and conversion of organic iron. Later work, however (Tartakowski), seems to prove conclusively that inorganic iron is assimilated and converted into hemoglobin, and in so far is therapeutically fully equal to organic iron. Many authors, nevertheless, still adhere to the theories of Bunge and Abderhalden. At all events, a real difference exists between the organic and most of the inorganic preparations, namely, in the local irritant and astringent action of the latter, and the absence of these effects in most of the organic compounds. These actions may be desirable in some cases, and undesirable in others. It should also be remembered that organic iron may often be administered in sufficient amount, and most economically, by selecting a dietary rich in iron, such as red meats, egg-yolks, green vegetables and whole wheat, etc.

ORGANS OF ANIMALS.

The discovery of the importance of internal secretions has led to extensive clinical trials with preparations of the so-called ductless glands, and other tissues which elaborate, or are supposed to elaborate, such internal secretions. Two of these, the thyroid and suprarenal glands, have given decisive therapeutic results and have become official in the Pharmacopœia; preparations of the active principle of the suprarenal are described in this book under the heading of "Epinephrine." The other organ products are scarcely beyond the experimental stage, and may therefore be described together. Their active principles have not been isolated, and they are most commonly used in the form of the powdered dried gland. The gross fat and connective tissue should be removed as completely as possible, and the drying should be conducted at a relatively low temperature. The powder is frequently compressed into tablets. It is recommended that the strength of these should be stated in terms of the dried gland. Since there are no tests for the quality, or even identity, of these powdered products, the physician, unless he can himself supervise their preparation, is forced to rely on the general reputation of the manufacturer.

After the description of each gland a list of such preparations as have been submitted to the Council, and which are being marketed in an unobjectionable manner, is given. For the reasons stated, however, the Council disclaims any responsibility for their quality or identity.

CORPUS LUTEUM.

It is generally recognized that one or more of the most important of the internal secretions of the ovaries originate in the corpora lutea and the latter have been tried recently to a considerable extent in some of the classes of cases in which the entire gland has been used. Thus it is stated that in conditions of amenorrhea or of scanty menstruation it markedly increases the menstrual flow and prevents nervous symptoms accompanying these conditions. It may be given by the mouth in the form of the dried corpora lutea (also called lutein) either as a powder, in capsules, or in tablets, or subcutaneously in the form of a normal saline extract. It is recommended that the administration be begun before the expected natural period and continued during it; after the cessation of the period the administration should be discontinued. It is also stated that in cases of artificial menopause, following operation, the use of the dried corpus luteum has been followed by great improvement.

The use of corpus luteum has been suggested in obesity associated with amenorrhea and in other conditions of "ovarian insufficiency;" Fränkel states that the drug has no effect in dysmenorrhea, irregular menstruation and the intoxication of pregnancy.

This drug must be considered to be in the experimental stage.

DESICCATED CORPUS LUTEUM-Armour.—Desiccated corpus luteum-Armour consists of the fresh substance from the corpora lutea from cows' ovaries, removed, dried and powdered without the addition of preservatives or diluent.

A yellowish powder, having a peculiar odor. Partly soluble in water.

One part represents approximately 5 parts of the fresh corpus luteum substance. It contains a true lipochrome which may be extracted by alcohol, ether or chloroform. On incineration, it should yield not more than 6 per cent. of ash.

Actions and Uses.—See Corpus Luteum.

Dosage.—From 0.03 to 0.06 Gm. ($\frac{1}{2}$ to 1 grain) twice daily.

Manufactured by Armour & Co., Chicago. Not patented or trademarked.

MAMMARY GLAND.

The extracts of the mammary gland are said to have an effect upon the uterus. It is stated that they are useful in the profuse menstruation of young girls and young women and in menorrhagia occurring at the time of the menopause.

MAMMARY SUBSTANCE-Armour.—Mammary substance-Armour consists of the mammary gland of the sheep freed from fat, cleaned, dried and powdered, without the addition of preservative or diluent.

A yellowish to orange colored powder, having a slight peculiar odor. Only partially soluble in water.

One part represents approximately $4\frac{1}{2}$ parts of the fresh mammary gland of the sheep. It contains nucleoproteid which, when treated with dilute sulphuric acid, yields guanin. (S. Fränkel, Descriptive Biochemie, p. 386.) Upon incineration it should not yield more than 9 per cent. ash.

Actions and Uses.—See Mammary Gland.

Dosage.—From 0.13 to 0.3 Gm. (2 to 5 grains) three times daily.

Manufactured by Armour & Co., Chicago. Not patented or trademarked.

Mammary Substance Tablets-Armour.—Each tablet contains desiccated mammary substance 0.13 Gm. (2 grains).

Dose.—From 1 to 3 tablets three times a day.

OVARY.

The ovaries produce internal secretions which are necessary for the proper functioning of the uterus and which also have obscure effects on metabolism and the nervous system. Diminution or cessation of the activity of the ovaries (as at menopause, natural or artificial) often leads to a variety of nervous symptoms; irregularities in their activities seem sometimes to be accompanied by dysmenorrhea. Ovarian substance has been administered, often with apparently good results, for the relief of symptoms following the natural or artificial menopause and in dysmenorrhea, intermenstrual pain, etc. The best results have been obtained in cases of post-operative menopause, especially in young women. Various disturbances of the skin (acne, eczema and prurigo) occurring during the menopause are said to be benefited by it. It is said to give good results in some cases of amenorrhea with chlorosis.

OVARIAN SUBSTANCE-Armour.—Ovarian substance-Armour consists of the entire fresh ovaries (including the corpora lutea) of the hog, cleaned, dried and powdered, without the addition of either preservative or diluent.

A yellowish colored powder having a peculiar odor. Partially soluble in water.

One part represents approximately 6% parts of the fresh ovary of the hog. It contains gelatin, mucin, nuclein and the active constituent of the corpus luteum. Upon incineration, it should not yield more than 7 per cent. ash.

Actions and Uses.—See Ovary.

Dosage.—From 0.06 to 0.2 Gm. (1 to 3 grains) three times daily.

Manufactured by Armour & Co., Chicago. Not patented or trademarked.

Ovarian Substance Tablets-Armour.—Each tablet contains ovarian substance 0.13 Gm. (2 grains).

Dose.—From 1 to 2 tablets three times a day.

PARATHYROID GLAND.

The administration of parathyroid has proved of value in a number of cases of tetany following the operative removal or injury of the parathyroid glands. It has prevented the attacks of tetany and seems undoubtedly, at times, to have prolonged life or to have saved it while the injured glands regained their functions. It has proved of value in some cases of gastric tetany and of infantile tetany, although in other cases the results were negative. It has been recommended in paralysis agitans, eclampsia and chorea (especially of adults), but the reports as to its usefulness in these conditions are very contradictory.

In some cases the use of the fresh glands or of the subcutaneous injection of extracts of the fresh glands has given better results than have the dried glands.

DESICCATED PARATHYROID GLAND-Armour.—Desiccated parathyroid gland-armour consists of the exterior parathyroids of the ox freed from fat, cleaned, dried and powdered, without the addition of preservative or diluent.

A light yellow powder having a peculiar odor. Partly soluble in water.

One part represents approximately six parts of the fresh tissue. On incineration it should yield not more than 7 per cent. ash. It contains very small amounts of organically combined iodine.

Action and Uses.—See parathyroid gland.

Dosage.—0.006 Gm. (1/10 grain) four times a day.

Manufactured by Armour & Co., Chicago.

Parathyroid Tablets-Armour.—Each tablet contains desiccated parathyroid gland 0.003 Gm. (1/20 grain).

PITUITARY GLAND.

The anterior lobe of this gland is essential to life; its total removal leads to death in a short time and its partial removal or disease to a condition of retarded growth or infantilism, to obesity and other disturbances of nutrition. The hyperactivity of the anterior lobe (as in acromegaly) leads to accelerated and abnormal growth—gigantism. These effects are believed to be due to an internal secretion.

The posterior lobe and pars intermedia contain a substance or substances having marked effects upon plain muscle, especially that of the blood-vessels and the uterus.

The administration of the anterior lobe has given favorable results in the later stages of acromegaly and in the condition known as dys-trophia adiposogenitalis, and in certain cases of obesity. It is contra-indicated in the early stages of acromegaly.

Extracts of the posterior lobe injected subcutaneously have been highly recommended in cases of uterine atony in post partum and other forms of uterine hemorrhage, and in shock and in various other conditions of low blood-pressure. It has been recommended in certain cases of pulmonary hemorrhage and intestinal paresis after abdominal operations. Its administration by the mouth seems to be less effective.

DESICCATED PITUITARY SUBSTANCE (ANTERIOR LOBE-Armour).—Desiccated pituitary substance (anterior lobe)-Armour consists of the anterior lobe from the pituitary of the ox, separated, dried and powdered without the addition of preservative or diluent.

A light grayish-yellow powder having a slight peculiar odor. Partly soluble in water.

One part represents approximately 4.5 parts of the fresh substance. On incineration it should yield not more than 6.5 per cent. ash.

Actions and Uses.—See Pituitary Gland.

Dosage.—From 0.05 to 0.20 Gm. (1 to 4 grains) in powder or tablet.

Manufactured by Armour & Co., Chicago.

DESICCATED PITUITARY SUBSTANCE (POSTERIOR LOBE)-Armour.—Desiccated pituitary substance (posterior lobe)-Armour consists of the posterior lobe from the pituitary of the ox, separated, dried and powdered without the addition of preservative or diluent.

A light grayish-yellow powder having a slight peculiar odor. Partly soluble in water.

One part represents approximately 4.5 parts of the fresh substance. On incineration it should yield no more than 6.2 per cent. of ash.

Actions and Uses.—See Pituitary Gland.

Dosage.—From 0.5 to 0.20 Gm. (1 to 4 grains) in powder or tablet.

Manufactured by Armour & Co., Chicago.

PITUITARY BODY DESICCATED-Armour.—Desiccated pituitary body-Armour, consists of the dried substance of the entire pituitary body of the ox, including the infundibulum and the anterior and posterior lobes without the addition of preservative or diluent. It is said to contain all the active principles naturally existing in the gland.

A light yellowish-gray powder, practically odorless and tasteless. One part represents approximately 4 parts of fresh gland.

Actions and Uses.—See Pituitary Gland.

Dosage.—From 0.06 to 0.2 Gm. (1 to 3 grains) three times a day.

Manufactured by Armour & Co., Chicago. Not patented or trademarked.

Pituitary Tablets-Armour.—Each tablet contains desiccated pituitary body 0.06 Gm. (1 grain).

PITUITARY LIQUID.—*Extractum hypophysis cerebri liquidum, Armour.*—Pituitary liquid is a sterile solution containing the active principle of the posterior lobe of the pituitary body of the ox, free from preservatives. Each cubic centimeter represents 0.2 Gm. of the fresh posterior lobe of the pituitary body in physiologic salt solution.

Pituitary liquid is made from the posterior lobe of the pituitary body of the ox by finely mincing the fresh glands and extracting with acidulated water. As the active principle is not destroyed by heat, the liquid is heated to boiling for the purpose of removing coagulable proteids and is then further purified by removing organic impurities such as peptones and other proteids. The clear colorless liquid is filled into one cubic centimeter ampoules and sterilized.

Pituitary liquid is a clear, colorless liquid having a faint but characteristic odor and slightly salty taste.

Pituitary liquid gives the biuret reaction. Alkaloidal precipitants such as phospho-molybdic acid, phospho-tungstic acid, bromine water, etc., all give faint but distinct precipitates of the active principle.

Actions and Uses.—Pituitary liquid stimulates the unstriped muscle, especially affecting the arteries, spleen, uterus and intestinal muscles.

Pituitary liquid is said to be useful in cases requiring stimulation of the heart or raising of the arterial tension, but these effects are of short duration. It is claimed to be diuretic, but this statement has been questioned. It is claimed to be valuable in paralytic distension of the intestines and in post-operative and other pareses as well as in promoting uterine contractions during labor.

This remedy should not be injected during the first stage of labor, because if the os uteri is not fully open the energetic contractions may cause a rupture of the uterus.

Dosage.—1 Cc. (15 minims) repeated in one hour if necessary. Pituitary liquid should be administered intramuscularly in the gluteal region under strict antisepsis in order to secure quick action and prevent necrosis. Pituitary liquid is supplied in one Cc. ampoules only.

Manufactured by Armour & Co., Chicago, Ill. No U. S. patent or trademark.

Ampoules Pituitary Liquid.—Each ampoule contains pituitary liquid 1 Cc.

RED BONE MARROW.

Red bone marrow consists largely (more than 90 per cent.) of fat. In new-born animals a third or more of this fat consists of lecithin. The marrow of the bones of new-born animals contains iron (up to 1 per cent. or more) in various forms of organic combination. Both lecithin and iron decrease rapidly in the first weeks after birth. The

commercial preparations contain very variable amounts of these constituents.

Action and Uses.—Red bone marrow is supposed to stimulate the formation of red blood corpuscles; whatever action it may have in this direction is probably due largely to the iron and lecithin which it contains.

It is said to be useful in simple and pernicious anemias.

EXTRACT OF RED BONE MARROW.—Extract of red bone marrow is a glycerine extract of the red marrow of bones. It contains about 2 per cent. of proteids, about 0.1 per cent. of lecithin and about 85 per cent. of glycerine.

It is a brownish liquid of an agreeable aromatic taste.

Actions and Uses.—This preparation is claimed to stimulate the formation of the red blood corpuscles.

It is recommended in simple and pernicious anemia, but its value is not yet beyond question.

Dosage.—From 4 to 8 Cc. (1 to 2 fluidrams) in water, milk or wine, three times a day.

Prepared by Armour & Co., Chicago.

THYMUS GLAND.

Little is known as to the functions of the thymus, but it is believed to have an important relation to growth. There also seems to be some relation between the thymus and thyroid, for the former is frequently abnormal in diseases involving the latter (hyperthyroidism).

The use of thymus is purely empirical. It has been employed in the treatment of hyperthyroidism, rickets, tuberculosis, hemophilia, and infantile marasmus and atrophy; its use in the latter conditions is said to be the most promising. It is claimed on very doubtful grounds to exert a somewhat favorable effect in certain cases of cancer.

DESICCATED THYMUS-Armour.—Desiccated thymus-Armour consists of the fresh thymus gland of the calf freed from fat, cleaned, dried and powdered, without the addition of preservative or diluent.

A very light yellow powder having a peculiar odor. Partly soluble in water.

One part represents approximately 5 parts of the fresh thymus gland. It is rich in nucleoprotein and in lymphoid tissue. Upon incineration it should yield not more than 12 per cent. ash.

Actions and Uses.—See Thymus Gland.

Dosage.—From 0.13 to 0.25 Gm. (2 to 4 grains) three times daily.

Manufactured by Armour & Co., Chicago. Not patented or trademarked.

Thymus Tablets-Armour.—Each tablet contains desiccated thymus 0.065 Gm. (1 grain).

Dose.—From 2 to 4 tablets three times a day.

ORTHOFORM-NEW.—Meta-Amido-Para-Oxybenzoate of Methyl.—Orthoform-new is methyl meta-amino-para-oxybenzoate, $C_6H_3.NH_2.OH.CO.O(CH_3)$, 3:4:1, the metamino-para-oxybenzoic acid ester of methyl alcohol.

It is prepared by the nitration of para-oxybenzoate of methyl and reduction of the nitro-product obtained.

It occurs in a fine, white, crystalline powder, neutral in reaction, and melting at 141° to 143° C. (285.8° to 289.4° F.), odorless and tasteless. It is scarcely soluble in water but soluble in 5 or 6 parts of alcohol and 50 parts of ether. It is decomposed by boiling with water or by warming with alkalies or their carbonates, into methyl alcohol and paraoxybenzoic acid. When crystallized from chloroform it sometimes assumes the form of white crystals, melting at 110° to 111° C. (230° to 231.8° F.) returning on melting to the ordinary form.

The filtrate obtained after shaking a small portion with water produces a fugitive color with ferric chloride and should not give a reaction with silver nitrate. A solution of 0.1 Gm. in 2 Cc. of water by the aid of hydrochloric acid is colored yellowish-red on addition of sodium nitrate and then deposits a yellow precipitate deepening to red on exposure to the air.

It is decomposed by heating with water; it is incompatible with alkalies and their carbonates.

Actions and Uses.—Orthoform-new is a local anesthetic, resembling cocaine in its local action, but not penetrating the tissues on account of its insolubility. It has practically no action on the unbroken skin and produces no irritation except slight corrosion about the place of application. It is somewhat antiseptic and practically non-toxic in the usual doses.

It is used internally to relieve the pain of gastric ulcer. Since it acts only on ulcerated surfaces, the relief of pain has been assumed to be evidence of the existence of an open ulcer. It has been applied locally as an analgesic to wounds of every description. It has been used in dentistry, in nasal catarrh, hay fever, etc.

Dosage.—Internally, from 0.5 to 1 Gm. (8 to 15 grains) in emulsion; locally, in substance as a dusting powder or mixed with milk sugar for insufflation, dissolved in ether and mixed with oil for pencillings, or as salve with wool fat, etc.

Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a.M., Germany (Farbwerke Hoechst Co., New York). U. S. patents Nos. 610,348 (Sept. 6, 1898; expires 1915) and 625,158 (May 16, 1899; expires 1916).

ORTHOFORM-NEW HYDROCHLORIDE.—Orthoform-new hydrochloride, $C_8H_9O_3N.HCl$, is the hydrochloride of methyl meta-amino-para-oxybenzoate.

It is a white, crystalline powder, having an indefinite melting point and an acid reaction. It is soluble in 10 parts of water. Its reactions are the same as those of orthoform-new, except that it gives a reaction for chlorides with silver nitrate and has an acid reaction: 3.65 Gm. dissolved in 50 Cc. of alcohol require not less than 17.8 Cc. nor more than 18 Cc. of normal solution of sodium hydroxide to produce a neutral liquid.

Its incompatibilities are the same as those of orthoform-new.

Actions and Uses.—The actions, uses and dosage of this compound are similar to those of orthoform-new, which see.

Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a.M., Germany (Farbwerke Hoechst Co., New York).

OVOFERRIN.—Ferri Vitellinum Syntheticum.—Ovoferrin is a solution containing 5 per cent. of an artificial proteid-product in which iron is present in the so-called "organic" or "masked" form (a form which does not give the iron-test directly) equivalent to 0.4 Gm. metallic iron to each 100 Cc. The solution also contains 9 per cent. of alcohol.

Ovoferrin is prepared by modifying serum-albumin by electrolysis, producing a proteid which is classed by the manufacturers as a vitellin, and introducing ferric hydrate into this proteid by heating under pressure. The "vitellin" constituent of this preparation should not be confounded with the well-known vitellin of yolk of eggs.

The solution has a reddish-brown color, little odor, and a flat, slightly aromatic and alcoholic taste.

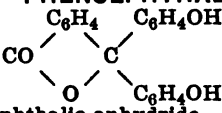
The solution does not give a blue color on the addition of potassium ferrocyanide solution; a blue tint develops slowly if an equal volume of 5 per cent. hydrochloric acid is added to the mixture; a deep blue color develops at once if this mixture is boiled (difference from the egg yolk).

The solution is not precipitated by boiling, but gives precipitates with the alkalis, with which it is incompatible. It is also precipitated on half saturation with ammonium sulphate. It is not precipitated by acids.

Actions and Uses.—Ovoferrin is stated to be not appreciably affected by the gastric juice, a 0.5 per cent. solution of hydrochloric acid liberating its iron very slowly and incompletely. The product ranks with the other forms of artificially masked iron, which are devoid of the local action of the soluble inorganic iron salts, and, according to some authorities, are more readily absorbed and utilized.

Dosage.—From 8 to 16 Cc. (2 to 4 fluidrams) corresponding to from 0.03 to 0.06 Gm. ($\frac{1}{2}$ to 1 grain) of elemental iron three times a day.

Manufactured by A. C. Barnes Co., Philadelphia. U. S. trademark.

PHENOLPHTHALEIN.—Phenolphthalein,  is a product of the interaction of phenol and phthalic anhydride.

It may be prepared by heating together 10 parts of phenol, 5 parts of phthalic anhydride and 4 parts of concentrated sulphuric acid for 10 to 12 hours at 115° to 120° C. (239° to 248° F.). The product of the reaction is boiled with water, and the residue dissolved in soda lye. From this solution the phenolphthalein is precipitated by the addition of acetic acid. The precipitate after washing is dissolved in six times its weight of absolute alcohol and the solution decolorized by animal charcoal. A part of the alcohol is then distilled, the mixture filtered and the phenolphthalein separated from the filtrate by the addition of water.

Phenolphthalein occurs as a crystalline or amorphous powder, white or grayish-white, melting at 250° to 253° C. (482° to 487.4° F.). It is soluble in 600 parts of water and in 10 of alcohol. Its solutions in acid liquids are colorless, but turn red when the liquid is alkaline. The red color of the solution disappears if it be boiled with zinc dust, phenolphthalein, $C_{20}H_{14}O_4$, being formed.

Phenolphthalein heated on platinum foil should burn, leaving no residue.

Actions and Uses.—Phenolphthalein acts as a purgative, but appears to possess no further physiologic action. A case of poisoning from taking 1 Gm. (15 grains) is reported.

Dosage.—For adults the average dose is from 0.1 to 0.2 Gm. (1.5 to 3 grains) given as powder, in cachets, capsules or pills. It may be given with safety in doses of 0.5 Gm. (8 grains), and these doses seem to be necessary to secure its effects in bed-ridden patients or in obstinate cases.

PICRIC ACID.—*Acidum Picricum.*—*Acidum Picricum* (Pharm. Française, 1908). Picric acid is 2,4,6-tri-nitro-1-phenol, $C_6H_3O_7N_3$ or $C_6H_2.OH(NO_2)_3$ (1:2:4:6), an acid obtained by nitrating phenol.

Picric acid occurs as orthorhombic yellow prisms, odorless, but with a very bitter taste, with a specific gravity of 1.81 and melting at $122^\circ C.$ ($251.6^\circ F.$). It is explosive when heated to a high temperature. It is slightly soluble in cold water, imparting a yellow color to a very large volume of water. It is soluble in 81 parts water at 20° and in 25 parts at 80° . It is easily soluble in alcohol and in 5.7 parts of dry pure ether it dissolves to an almost colorless solution. (Pharm. Française, edit. 1908.)

Aqueous solutions dye organic matter, such as silk, wool and skin a characteristic yellow, but do not dye vegetable fiber.

One part picric acid dissolved in 9 parts water at $60^\circ C.$ and a warm solution of 2 parts potassium cyanide in 4 parts water when mixed give a red color. This solution on being cooled yields reddish brown plates of potassium picrocyanin or isopurpuric acid $C_6H_4KN_5O_6$.

Ammonium sulphide produces a red color in solutions of picric acid which becomes deeper on heating. (Pharm. Française, edit. 1908.)

The absence of salts of picric acid is demonstrated by its complete solubility in ether. (Pharm. Française, edit. 1908.)

Actions and Uses.—Picric acid is an irritant to the skin and mucous membranes. Taken internally, it may produce nausea, vomiting and diarrhea. The urine is colored red or yellow and may show signs of nephritis. The skin and mucous membranes may be stained yellow and thus jaundice may be simulated. Red blood cells are partly dissolved and the white cells are increased in number. It is said to be a very useful application for burns, but the application has been said to be painful in certain cases. Toxic symptoms have been produced in some instances, especially in children, by absorption through the skin.

Cloths are saturated with this solution and applied after proper cleansing of the burned area. Over this is placed a pad of dry absorbent cotton which is fastened by a light bandage. The dressing rapidly dries and may be left in place for several days. Caution should be used in applying this solution to large surfaces.

Dosage.—From 0.025 to 0.1 Gm. ($\frac{1}{2}$ to 2 grains). A solution containing 6 parts of picric acid, 60 parts of alcohol to 1,000 parts of water has been recommended for local application.

PIPERAZINE.—*Piperazina.*—*Diethylenediamine.* — *Ethyleneimine.* —

Piperazine, $NH \begin{array}{c} \diagup CH_2.CH_2 \diagdown \\ \diagdown CH_2.CH_2 \diagup \end{array} NH + 6H_2O$, is a synthetic base obtained by

the condensation of two $.CH_2.CH_2.$ groups, with two $:NH$ groups, containing 6 molecules of water of crystallization.

It is prepared by the interaction of ammonia on ethylene chloride, treating the complex mixture of different salts produced with sodium nitrate at 60° to $70^\circ C.$ (140° to $158^\circ F.$), purifying the sparingly soluble dinitroso-piperazine, which separates as a scaly crystalline mass, by repeated crystallizations from hot water, and subjecting the pure dinitroso-piperazine so obtained to distillation with an alkali. It is also prepared by several other patented processes.

It forms colorless, lustrous, tabular crystals, hygroscopic, which melt at $44^\circ C.$ ($111.2^\circ F.$). It is extremely soluble in water, forming strongly alkaline but non-caustic solutions. It is not so readily soluble in alcohol. It is volatile. It forms soluble salts with acids, and with uric acid it forms a very soluble salt (in 50 parts of water; lithium urate requires 368 parts of water). It is not af-

fectured by chromic acid, but is slowly oxidized by potassium permanganate.

In aqueous solution it gives a characteristic scarlet-red precipitate with potassium-bismuth iodide, a white precipitate with Nessler's reagent, and is precipitated light blue by copper sulphate, white by mercuric chloride, lemon-yellow (crystalline) by picric acid and grayish by tannic acid.

It is incompatible with acetanilid, acetphenetidin (phenacetin), alkaloidal salts, nitrites, metallic salts in general and with picric and tannic acids. It should not be exposed to moisture.

Actions and Uses.—A part of the piperazine ingested passes undecomposed into the urine and is claimed by some to form a very soluble compound with the urinary uric acid; others state that the piperazine which is excreted is largely in combination with the stronger mineral acids. It has been shown that urine containing piperazine has no greater solvent power on uric acid than ordinary urine. Piperazine seems to produce no symptoms in man or animals, even when administered in fairly large quantities, although it is stated that, after large doses, tremors, clonic spasms and general depression have occurred.

Piperazine is claimed by the manufacturer to be useful in the prevention of the formation of renal and vesical calculi and for the relief of irritation of the bladder due to excess of uric acid in the urine and in cases of chronic gout, rheumatism, renal colic, etc. There is no reliable evidence to warrant the acceptance of these claims. The attempt to secure the solution of uric acid in the body of this as well as other remedies has not been successful in the experience of many clinicians.

Dosage.—0.3 to 0.6 Gm. (5 to 10 grains); daily dose, 1 to 2 Gm. (15 to 30 grains). Owing to its hygroscopic character, it is impracticable to dispense it in powder; it should, therefore, be dispensed in solution in water, plain or carbonated, but in quantities sufficient for a day's supply only.

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Farbenfabriken of Elberfeld Co., New York). U. S. patent No. 482,108. Also by Chemische Fabrik auf Aktien vorm. B. Schering, Berlin (Schering & Glatz, New York). U. S. patent No. 543,214 (expired).

Piperazine Tablets, 16 grains.—Each tablet contains piperazine 1.03 Gm. (16 grains).
Prepared by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Farbenfabriken of Elberfeld Co., New York).

PLACENTAPEPTON.—Placentapepton is a preparation of peptone derived from the placenta and employed for the purpose of the optical test for pregnancy according to Abderhalden.

Placentapepton is a yellowish powder, soluble in water and having the properties of peptone.

Actions, Uses and Dosage.—One Cc. of the serum to be examined, which must be absolutely free from hemoglobin, is mixed with 1 Cc. of a 5 per cent. solution of placentapepton in 0.9 per cent. solution of sodium chlorid. This mixture is placed in an Abderhalden polarization tube of 2 Cc. capacity surrounded with a water jacket. The rotation is immediately determined. The polarization tube is then placed in the incubator and examined at intervals of two hours at first and later at longer intervals for the amount of rotation. This test of rotation should be continued not longer than forty-eight hours. Only variations of 0.05 degree are to be regarded as essential changes in the rotatory

power. Placentapepton cannot be employed in the diffusion test for pregnancy.

Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a.M., Germany (Farbwerke Hoechst Co., New York). No U. S. patent or trademark.

POLLANTIN, FALL.—Dunbar's Serum.—Antitoxic serum from horses treated with pollen toxin derived from ragweed.

Horses are injected with gradually increased doses of pollen toxin (derived from ragweed), which results in the formation of an antitoxin after two or three months of treatment. The horses are then bled and the strength of the serum is estimated by determining the proportion which will prevent the action of a solution of pollen toxin, of which one drop is barely sufficient to produce a reaction when instilled into the conjunctival sac of a hay-fever patient. The serum is preserved by the addition of 0.25 per cent. of phenol.

It is a clear, slightly yellowish liquid, having the odor and taste of a dilute solution of phenol. On standing, the liquid deposits a slight precipitate. The liquid is alkaline in reaction and not irritating to the normal conjunctiva.

It should neutralize the effects of a solution of pollen toxin when mixed with it and dropped into the eye or when a drop is applied immediately after a drop of the toxin solution.

The liquid does not keep well if exposed to the air. When it becomes cloudy or a bad odor develops, decomposition has occurred and the preparation should no longer be used.

Actions and Uses.—Pollantin, Fall, has no pharmacologic action except the neutralization of the pollen toxin. The serum is not intended for use hypodermically. It is employed for the relief of hay fever and it seems to be effective in a proportion of cases. It may be used as prophylactic.

Dosage.—One drop should be instilled by means of a pipette into the outer angle of each eye and one or two drops into one nostril, the other being kept closed, every morning before rising. If the first application causes sneezing or reddening of the mucous membrane of the eye, the directions are to repeat the application, even for the fourth time, if necessary.

Manufactured by Schimmel & Co., Miltitz, near Leipzig, Germany (Fritzsche Bros., New York). U. S. patent No. 745,333 (Dec. 1, 1903; expires 1920). U. S. trademark No. 40,562.

POLLANTIN POWDER, FALL.—A powder obtained by evaporating, in vacuo, pollantin serum derived from ragweed toxin at about 45° C. (113° F.), and mixing it with sterilized sugar of milk.

It is a fine, slightly yellowish, almost odorless powder, almost but not entirely soluble in water, and having a slight alkaline reaction. The tests are the same as for the liquid. It should reduce Fehling's solution. The powder keeps well.

Actions and Uses.—The same as those of the liquid.

Dosage.—The powder is applied to the eyes by dusting on the conjunctiva and to the nose by snuffing into one nostril, the other being closed, a piece as large as a lentil.

Manufactured by Schimmel & Co., Miltitz, near Leipzig, Germany (Fritzsche Bros., New York). U. S. trademark No. 40,562.

PROFERRIN.—Iron Nucleo-Proteid.—Proferrin is a compound of iron and milk casein containing iron equivalent to about 10 per cent. ele-

mentary iron and phosphorus equivalent to about 0.5 per cent. elementary phosphorus.

Proferrin is prepared by treating an alkaline solution of casein with a solution of an iron salt and precipitating with acetic acid. Proferrin is a brown powder, almost odorless and tasteless, insoluble in water and dilute acids, slowly soluble in alkalis.

If, to the dry powder, fuming nitric acid be added, an orange red color, due to the proteid, results. If the dry powder be heated in a crucible, the odor of burning nitrogenous matter will be given off and the residue if dissolved in hydrochloric acid will give the usual tests for iron. If 0.5 Gm. be shaken with 10 Cc. distilled water, and the mixture filtered, the filtrate should give no precipitate on addition of ammonium hydroxide, and not more than a faint bluish tint on addition of a few drops of potassium ferro-cyanide solution (limit of inorganic iron).

If about 2 Gm. proferrin be digested for three hours at 40° C., with 40 Cc. of 0.2 per cent. hydrochloric acid containing 0.006 Gm. pepsin U. S. P., and the resulting mixture filtered, 5 Cc. of the filtrate diluted to 100 Cc. should produce not more than a faint blue color on the addition of a drop of potassium ferrocyanide solution.

The iron and phosphorus may be determined by the usual methods for organic compounds containing these elements.

Action and Uses.—Proferrin has been recommended as a ferruginous tonic and as a means of restoring the iron and phosphorus waste of the body. It undergoes very little change in the stomach but is said to be quickly digested and absorbed in the intestine. Its hematogenous actions resemble those of other organic iron preparations.

Dosage.—0.13 to 0.3 Gm. (2 to 5 grains.)

Manufactured by H. K. Mulford Co., Philadelphia, Pa. No U. S. patent. U. S. trademark No. 33,614.

Dosage forms:

Proferrin Tablets, 1 grain.—Each tablet contains proferrin 0.065 Gm. (1 grain).

Proferrin Tablets, 2½ grains.—Each tablet contains proferrin 0.15 Gm. (2½ grains).

Proferrin Tablets, 5 grains.—Each tablet contains proferrin 0.3 Gm. (5 grains).

PROTARGOL.—Protein Silver Salt.—Protargol is a compound of albumin and silver containing 8.3 per cent. in organic combination.

According to the patent specification insoluble protein silver compounds, obtained by treating protein bodies with silver salt, are rendered soluble by treatment with a solution of albumoses.

It is a light-brown powder, soluble in twice its weight of cold water, producing a solution which is not affected by the ordinary precipitants of silver salts, such as alkalis, sulphides, chlorides, bromides, iodides, nor by heat.

Ammonium sulphide gives a dark color to the solution without precipitation. Addition of strong hydrochloric acid produces a precipitate of unchanged protargol, soluble in a large quantity of water. A solution containing sulphuric acid is not colored blue by diphenylamine. It is compatible with picric acid and picrates and with most metallic salts. It should not be exposed to light. It is precipitated by cocaine hydrochloride, but this is prevented by addition of boric acid.

Actions and Uses.—Protargol is claimed to be a non-irritant bactericide and antiseptic. It is said to be useful in acute and chronic gonorrhea as a non-irritant substitute for silver nitrate and in diseases of the mucous membranes of the eye, ear, nose and throat, and particularly in the treatment of conjunctivitis.

Dosage.—From 0.25 or 1 per cent. solution in acute gonorrhea, to 5 or 10 per cent. instillations in chronic cases, in cystitis and urethritis; in solutions of 1:1000 to 1:2000 as irrigations. Used also in form of bougies and tampons (5 to 10 per cent.). Its solutions in water are made by pouring on the protargol a little cold water, stirring into a thick paste, and gradually adding the remainder of the water under stirring; or by sprinkling the protargol on the surface of the whole of the water (cold) and setting it aside until solution occurs.

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Farbenfabriken of Elberfeld Co., New York). U. S. patent No. 615,970 (Dec. 13, 1898; expires 1915). U. S. trademark No. 30,882.

QUININE DERIVATIVES.

EUQUININE.—*Quininae Aethylcarbonas.*—Quinine Ethyl Carbonate.—**Euchinin.**—Euquinine is quinine ethyl carbonate, $(C_2H_5).O.CO.O.(C_{20}H_{23}N_2O)$, the quinine ester of ethyl carbonic acid ester.

It is prepared by the action of chlorocarbonic ethyl ester on quinine, $C_{20}H_{23}N_2O.COCl + C_2H_5.O.CO.OH = HCl + C_2H_5.O.CO.O.C_{20}H_{23}N_2O$.

It is a light, fleecy conglomeration of delicate, white needles, melting at $95^\circ C.$ ($203^\circ F.$) and practically tasteless. It is sparingly soluble in water, but readily soluble in alcohol, ether and chloroform. It is slightly alkaline in reaction, forming well crystallizable, bitter salts with acids. It produces a tasteless tannate.

Its solutions in acidulated water have the characteristic bitter taste of quinine. On heating a mixture of 0.2 Gm. of euquinine, 3 Cc. of solution of sodium hydroxide and a little iodine, the odor of iodoform is manifested. Like quinine its solution in dilute sulphuric acid exhibits strong, blue fluorescence, and it gives also the so-called thalleioquin reaction, but not the herapathic reaction. A solution in nitric acid should not change on addition of either silver nitrate or barium chloride.

It should leave no residue on combustion.

It is incompatible with acids which will develop the bitter quinine taste.

Actions and Uses.—Euquinine is claimed to have the same action as quinine, with the advantage of being tasteless, owing to its insolubility in water and alkaline media.

Dosage.—The same as quinine.

Manufactured by Vereinigte Chininfabriken, Zimmer & Co., Frankfurt, a.M., Germany (Merck & Co., New York). U. S. patent No. 585,068 (June 22, 1897; expires 1914). U. S. trademarks Nos. 640,977 and 701,523.

QUININE AND UREA HYDROCHLORIDE.—*Quininae et Urea Hydrochloridum.*—*Chininum Bihydrochloricum Carbamidum.*—Quinine and urea hydrochloride, $C_{20}H_{24}N_2O_2.HCl + CH_4N_2O.HCl + 5H_2O$, is a compound of quinine hydrochloride and urea hydrochloride containing approximately 60 per cent. of anhydrous quinine.

Quinine and urea hydrochloride is prepared by dissolving 400 parts quinine hydrochloride in 300 parts of dilute hydrochloric acid, sp. gr. 1.061, mixing the solution with 60 to 61 parts of pure urea $CO(NH_2)_2$, warming the mixture until dissolved, filtering it through glass wool and setting the filtrate aside for crystallization. After twenty-four hours the crystals are brought on a filter, drained, washed with very cold distilled water, spread on flat plates and dried at room temperature. The mother liquor is evaporated and again set aside for crystallization. The second mother liquor, which is colored brown, is exposed in a dish to

spontaneous evaporation, during which all of the double salt of quinine slowly crystallizes out and may be separated.

The hydrochloride of quinine and urea crystallizes from hot solutions in hard white interlaced four-sided prisms. On spontaneous evaporation of a concentrated solution very large transparent prisms are formed. The salt dissolves at ordinary temperature in its own weight of water, forming a somewhat viscid straw-colored liquid, not altered by exposure to light. During its solution a marked lowering of temperature occurs.

It is not hygroscopic and is unalterable in the air excepting when warmed, the crystals lose their transparency and become yellowish. They fuse at from 70° to 75° C. (158° to 167° F.) with the loss of 10 per cent. of water, forming a yellowish liquid which congeals on cooling to a yellow mass. If this mass is allowed to stand in the air it takes up after a few days the whole amount of water expelled and becomes again white. If the melted salt is dissolved in water it may be completely recovered in a crystalline form. It is also soluble in alcohol and from this solution a salt of somewhat variable composition is precipitated by ether.

It is soluble in about 800 parts of chloroform.

Its aqueous solutions are of a strong acid reaction.

A solution of the salt in water 1 to 20 shows no fluorescence, but if one drop of this solution is added to 10 Cc. of distilled water in a test tube a vivid blue fluorescence is developed.

On drying the salt at 125° C. to constant weight and cooling in a desiccator, it should not lose more than 16.5 per cent. of its weight (corresponding to five molecules of water of crystallization).

On ignition the pure salt is slowly consumed, leaving no residue. Ammonia water, alkaline hydroxides or alkali carbonates throw down from the aqueous solution of quinine and urea hydrochloride a white precipitate of alkaloidal quinine, which, when carefully washed with cold distilled water until free from chlorides and dried at a low temperature, should conform to the reactions and tests given in the United States Pharmacopœia under quinine.

If quinine and urea hydrochloride be examined by the method given below the alkaloid found should weigh not less than 59.2 per cent. of the salt taken.

One Gm. dissolved in 2 Cc. of distilled water and well shaken in a stoppered test tube with 6 Cc. of ether and 2 Cc. of 10 per cent. ammonia water should be dissolved completely and no crystals should separate out from the ethereal solution on standing for six hours. If the ethereal stratum is removed to a tared beaker and the contents of the test tube washed successively with three portions of 5 Cc. each of ether and these ether washings also added to the tared beaker, the alkaloidal quinine remaining after evaporating off the ether, dried at 125° C. to constant weight, should weigh not less than 0.592 Gm.

If 2 Gm. of the salt be dissolved in a test tube in 4 Cc. of distilled water, the solution cooled and 4 Cc. of nitric acid U. S. P. (free from nitrous acid) be added, the solution quickly cooled again in ice water and the cold mixture set aside at a low temperature, separation of crystals will commence after a few minutes and crystallization will be completed after the solution has stood in a cold place over night. The crystals may be separated by the use of a small glass funnel provided with a pellet of glass wool. The test tube should be washed with three portions of 2 Cc. each of cold diluted nitric acid 1 and 1 and the acid carefully poured over the crystals in the funnel, drop by drop, to remove all traces of quinine. The remaining crystals should consist of urea nitrate. This is demonstrated by taking 3 Cc. of water, heating in the test tube in which the crystals have been crystallized, and after carefully draining off the acid which may be held back by the stem of the funnel, pouring the hot water slowly on the crystals in the funnels and repeating with another 2 Cc. of hot water. The resulting well-mixed solution is divided into two equal parts in two test tubes and cooled. To the first is added from a pipette 10 drops of solution of mercuric nitrate, U. S. P., and then, gradually, normal solution of sodium hydroxide until only a slightly acid reaction is obtained, when a copious white precipitate should result.

The second part of the filtrate is made strongly alkaline by the use of a solution of sodium hydroxide, 1 in 4, and to the resulting clear liquid is added 2 Cc. of a strong solution of sodium hypochlorite. The mixture is warmed to about 40° C., when a development of gas will take place at once.

Actions and Uses.—Quinine and urea hydrochloride has the actions of quinine. It is non-irritating when injected hypodermically. Recent investigations have shown that when injected hypodermically or when applied locally to mucous membranes it exerts an anesthetic action similar to that of cocaine. It is reported that the anesthesia is in some cases prolonged for several days.

Quinine and urea hydrochloride is said to be especially useful in the treatment of malaria by hypodermic injections. It has also been applied as a substitute for cocaine in the production of local anesthesia for operations.

Dosage.—The same as quinine. For the production of local anesthesia injections of a solution of from 0.25 to 1 per cent. strength are used. The 0.25 per cent. solution is said to be free from the risk of producing fibrous indurations, which sometimes occurs with the stronger solution. For application to mucous membranes solutions varying in strength from 10 to 20 per cent. should be used.

SECACORNIN.—Ergotin Roche.—Secacornin is a solution of the active principles of ergot in a menstruum consisting of distilled water, glycerine and 7.5 per cent. of alcohol. 1 Cc. of secacornin corresponds to 4 Gm. of ergot U. S. P. and is said to be standardized according to the method of Kehrler (*Arch. f. exp. Path. u. Pharm.*, vol. lviii).

Secacornin is prepared from ergot by removing fat by means of benzoin or similar solvent and exhausting by percolation with diluted alcohol. The total percolate is then deprived of its alcohol by distillation in vacuo. The resinous mass which separates after cooling is then carefully drained off and the clear filtrate, having been evaporated to the consistency of an extract, is mixed with the general vehicle.

Secacornin is a dark brown solution, said to be sterile. It is claimed that it does not deteriorate on keeping.

Secacornin responds to the following identity test: 1.6 Cc. secacornin is mixed with 3.0 Cc. distilled water and 5 drops of 10 per cent. ammonia water and shaken out in a separatory funnel with 20.0 Cc. of ether. After complete separation of the two liquids the aqueous solution is allowed to flow off, the remaining ether washed with 2.0 Cc. distilled water and the wash-water likewise carefully separated. After this the ethereal solution is filtered into an Erlenmeyer flask and traces of water removed by the use of as much anhydrous sodium sulphate as can be held on the point of a knife. Following this it is filtered into a small glass dish and cautiously evaporated.

The residue is then dissolved in from 1 to 1½ Cc. ferric-chloride-acetic acid (1 drop of *Liq. ferri. chloridi* with 200 Cc. acetic acid). To this solution is added with a pipette, cautiously and without mixing, in order to form an understratum, 3.0 Cc. pure concentrated sulphuric acid. At the point of contact of the two liquids a characteristic blue to violet ring forms after a time.

Action and Uses.—The same as ergot.

Dosage.—0.5 Cc. (8 minims) are equivalent to 2 Cc. (30 minims) of fluid extract of ergot U. S. P. It may be given by intramuscular injection in doses of from 0.5 to 1 Cc. (8 to 15 minims).

Manufactured by F. Hoffmann-LaRoche & Co., Basel, Switzerland (The Hoffmann-LaRoche Chemical Works, New York). Not patented. U. S. trademark No. 58,830.

SERUMS AND VACCINES.

The viruses, serums and vaccines constitute one of the most important groups of drugs with which the physician has to deal. Some prepara-

tions of this group are specific cures for certain diseases; others are invaluable in prophylaxis and diagnosis. The great importance of exercising some degree of governmental control over these products was recognized by the passage by Congress in 1902, of a law entitled "An Act to Regulate the Sale of Viruses, Serums, Toxins and Analogous Products in the District of Columbia, to Regulate Interstate Traffic in Said Articles, and for Other Purposes." The law provides for the licensing of manufacturers who make these products. In order to obtain such a license it is necessary for an establishment desiring it to request the Surgeon-General of the U. S. Public Health Service to have an inspection made of its laboratories, methods, products, etc. This inspection is made by an officer of that service, and consists in a careful examination of the stables, laboratory facilities, methods, animals, collection of the serum, standardization, and tests for potency, purity and amount of preservation. Samples of the products from licensed manufacturers are bought on the open market and examined at frequent intervals in the Hygienic Laboratory of the Public Health Service. The inspection of the laboratories is repeated at least once a year and if unsanitary conditions are found, or if the products are not what they are claimed to be, the license is suspended.

Antidiphtheric and antitetanic serums are required to conform strictly to the standards which have been established by the United States Government. There being no established standard for the various other products they are not examined for their therapeutic value in the laboratory, but are tested for the amount of preservative and freedom from bacterial and toxic contaminations. Vaccine virus is examined particularly for its freedom from pathogenic bacteria, especially tetanus, and also for its potency.

Of recent years prophylaxis and therapy by bacterial vaccines have been widely employed. While the subject was still in the experimental stage mixtures of vaccine, so-called "mixed" vaccines, were admitted to N. N. R. by the Council. With increasing experience, however, it has been found inadvisable to continue this form of recognition. Those at present included will be dropped at the expiration of three years from the time of their admission and none will be admitted or retained unless justification for their inclusion can be found.

The following pages contain a description of the preparations which may be legally sold in interstate commerce in the United States and which have not been found to conflict with the rules of the Council:

SERUMS AND VIRUSES.

SERUM ANTIDIPHThERICUM AND ANTIDIPHThERIC GLOBULINS.—Antidiphtheric serum or diphtheria antitoxin is an official preparation; for description see the U. S. Pharmacopœia, 8th decennial revision. The diphtheria antitoxin sold in interstate commerce in the United States and in the District of Columbia is required to conform to the standard established by the United States Public Health Service. Some manufacturers mix serums of different strengths so as to secure a preparation containing approximately a definite number of units per Cc. Most of the firms also market a concentrated diphtheria antitoxin or antidiphtheric globulins prepared by the removal, by precipitation with neutral salts, of most of the constituents of the serum except that fraction of the globulins bearing antitoxic potency.

Inasmuch as the ordinary (not concentrated) serum antidiphthericum is contained in the U. S. P., it is desirable that the term "U. S. P." be used in connection with this product (and only with this one) in order to avoid confusion with the globulin preparations.

The French, German and Spanish pharmacopœias recognize both liquid and desiccated preparations.

H. M. Alexander & Co., Marietta, Pa.

Diphtheria Antitoxin.—Only the antidiphtheric globulin is marketed; the antidiphtheric serum is concentrated and refined in accordance with recent improvements of the Gibson method. Marketed in syringes containing from 500 to 5,000 units.

Burroughs, Wellcome & Co., London, England, and New York City.

Diphtheria Antitoxin Serum.—Serums of different values from a number of horses are mixed to yield a definite value (from 450 to 500 units per Cc.), also a high potency serum, 1 Cc. of which contains 1,000 units. Trikresol (0.3 per cent.) is added as a preservative. Marketed in hermetically sealed vials containing 1,000 to 4,000 (Ehrlich-Behring) units; also a high potency serum containing from 1,000 to 10,000 units.

Cutter Laboratory, Berkeley, Cal.

Diphtheria Antitoxin.—Marketed in syringes containing 1,000, 2,000, 3,000, 4,000 and 5,000 units; also in bulbs. Diphtheria antitoxin globulin marketed in syringes containing 1,000 units.

Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a. M., Germany. (Farbwerke Hoechst Co., New York).

Diphtheria Antitoxin "Behring," imported into the United States only upon special order.

Department of Health, City of New York.

Refined and Concentrated Diphtheria Antitoxin (Globulin).—The preparation is a solution of the globulins of the blood which are soluble in a saturated sodium chloride solution; this contains most of the antitoxin. Preserved with chloroform. Marketed in syringes containing from 2,000 to 5,000 units, each Cc. containing 800 to 1,500 units. Also in bulk.

Wm. R. Hubbert, Detroit, Mich.

Diphtheric Antitoxin.—Marketed only in bulk (usually from 1 to 10 liters).

Lederle Antitoxin Laboratories, New York City. (Schleffelin & Co., New York).

Diphtheria Antitoxin.—Only antidiphtheric globulin is sold; this is marketed in syringes containing from 500 to 10,000 units each; also in vials containing from 1,000 to 5,000 units each. The latter are prepared more particularly for the use of Boards of Health.

Memorial Institute for Infectious Diseases, Chicago.

Antidiphtheritic Serum.—All of the antitoxin prepared is concentrated. Marketed in packages from 1,000 to 5,000 units each, both in syringes ready for use and in bottles.

H. K. Mulford Co., Philadelphia.

Diphtheria Antitoxin, Concentrated (Globulin).—Prepared from serum antidiphthericum by the removal, by precipitation at 33¼ per cent. saturation with ammonium sulphate, of the serum albumins and globulins. The product consists essentially of a soluble serum globulin freed from inorganic salts by dialysis and redissolved in physiological salt solution. Preserved with not more than ¼ per cent. trikresol or not more than 0.1 to 1 per cent. chloroform. Marketed in syringe containing from 1,000 to 10,000 units.

National Vaccine and Antitoxin Institute, Washington, D. C.

Diphtheria Antitoxin, Concentrated.—Prepared according to Gibson's method. Preserved with chloroform. Marketed in syringes containing from 500 to 6,000 units.

Parke, Davis & Co., Detroit, Mich.

Antidiphtheric Serum, U. S. P.—Preserved with 0.4 per cent. trikresol; marketed in piston syringe containers of from 500 to 5,000 units each.

Antidiphtheric Globulins.—Marketed as above.

Antidiphtheric Globulins (dry).—Marketed in packages of 3,000 units each. The dry powder is readily soluble in water and will keep indefinitely.

Slee Laboratories, Swiftwater, Pa. (The Abbott Alkaloidal Co., Chicago).

Slee's Refined and Concentrated Diphtheria Antitoxin.—Diphtheria Antitoxin (Slee's concentrated), prepared according to Banzhaf's method and preserved in 0.25 per cent. trikresol, contains less than 20 per cent. of solids. It is supplied in packages containing 1,000, 3,000, 5,000 and 10,000 units, in vials and also in syringes.

Frederick Stearns & Co., Detroit, Mich.

Diphtheric Antitoxin, U. S. P.—Preserved with 0.4 per cent. trikresol. Marketed in syringe containers holding from 1,000 to 4,000 units.

Concentrated Diphtheric Antitoxin.—Prepared by the Gibson process; preserved with chloroform (2.4 minims per fluidounce). Marketed as above; also in syringes containing 5,000 units.

ANTIDYSENTERIC SERUM.—

Farbwerke vorm. Meister, Lucius & Bruening, Hoechst a. M., Germany (Farbwerke Hoechst Co., New York).

Antidysenteric Serum.—The blood-serum of horses immunized against the Shiga bacillus. Recommended in dysentery and summer diarrhea in which the bacillus of Shiga is an etiologic factor. Marketed in bottles containing, respectively, 10 and 20 Cc.

H. K. Mulford Co., Philadelphia.

Antidysenteric Serum.—The blood-serum of horses immunized against the Shiga bacillus. Recommended in dysentery and summer diarrheas in which the bacillus of Shiga is an etiologic factor. Marketed in syringes containing 10 Cc. Dose 10 to 40 Cc. every four to eight hours; to be injected hypodermically.

ANTIGONOCOCCUS SERUM.—Favorable results have been reported from the use of antigenococcus serum in the treatment of chronic complications of gonorrhea involving serous cavities, especially the joints. The results in the case of the chronic stages and sequels of gonorrhea involving the genito-urinary tract seem to be less favorable while it seems to have still less value in acute gonorrheal affections.

Parke, Davis & Co., Detroit, Mich.

Antigonococcal Serum.—Prepared from the blood of rams immunized against both dead and living cultures of virulent gonococci according to the method of Rogers and Torrey.¹ Marketed in bulbs containing 2 Cc. each.

ANTIMENINGOCOCCUS SERUM.—

Farbwerke vorm. Meister, Lucius & Bruening, Hoechst a. M., Germany (Farbwerke Hoechst Co., New York).

Meningococcus Serum "Hoechst."—A serum prepared by the immunization of horses with virulent cultures of diplococcus intracellularis or its products according to Ruppel's method. Recommended as a diagnostic agent for distinguishing (by the agglutination test) the meningococcus from other diplococci and as a prophylactic and curative agent. It is injected subcutaneously or intraspinally or in the dry form may be used as a dusting powder applied to the nasopharyngeal space or tonsils. Marketed in powder form mixed with 49.5 per cent. milk sugar and 0.5 per cent. alumol, for use as a dusting powder; also in the dried form to be dissolved in 10 parts of water and injected

¹The Journal A. M. A., Sept. 14, 1907, xlix, 918.

subcutaneously or intraspinally; also in the liquid form, preserved with 0.5 per cent. phenol (for agglutination tests).

Dose.—2.5 Gm. of the dried serum, dissolved in 25 Cc. water, subcutaneously, to be followed, after lumbar puncture, by 10 to 15 Cc. or more, intraspinally. In severe cases much larger amounts are recommended. 1 Gm. as a protective dose.

H. K. Mulford Co., Philadelphia.

Antimeningitis Serum.—A serum prepared from the blood of horses immunized to the meningococcus of Weichselbaum (*Diplococcus intracellularis*), according to the method of Flexner (inoculation of autolyzed cultures followed by living organisms).

It is useful for the treatment of epidemic cerebrospinal meningitis, due to the meningococcus.

Dose.—15 to 30 Cc. (4 to 8 fluidrams) given by intraspinal injection. For young infants, 10 Cc. (2½ fluidrams). The serum is marketed in aseptic glass syringes with sterilized needle.

ANTIPNEUMOCOCCUS SERUM.—Antipneumococcus serum is the blood serum of horses immunized against pneumococci. Frequently both dead and living pneumococci are used.

Use.—This serum has been said to be useful in the treatment of pneumonia when injected subcutaneously. Hektoen, Weaver and Tunnickliff have recently examined the serums of this class found on the American market. They summarize their views as follows:

"In the antipneumococcus serums it was impossible to demonstrate antibodies for pneumococci by any method employed. It is our belief that the claims for the usefulness of antistreptococcus and antipneumococcus serums rest on impressions from results in clinical cases in man, and have in most cases no foundation whatsoever in experimental tests."

Farbwerke vorm. Meister, Lucius & Bruening, Hoechst a. M., Germany (Farbwerke Hoechst Co., New York).

Antipneumococcus Serum.—Stated to be prepared from highly virulent original cultures derived from human pneumococcus affections. Marketed in bottles containing 10 and 20 Cc., and also in powder form in vials containing 1 Gm. each. The dry serum is intended principally for the local treatment of ulcus serpens.

H. K. Mulford Co., Philadelphia.

Antipneumococcic Serum.—Stated to be prepared by immunizing horses with both dead and living pneumococci. Marketed in packages containing 2 syringes of 10 Cc. each. Dose: 20 to 100 Cc.

Frederick Stearns & Co., Detroit, Mich.

Pneumolytic Serum.—Stated to be a composite polyvalent serum prepared by injecting horses with virulent pneumococci from various sources. The horses are first immunized with diphtheric toxin. Marketed in syringes containing 20 Cc. Dose: 10 to 20 Cc., to be repeated in twelve to twenty-four hours.

ANTISTAPHYLOCOCCUS SERUM.—

Burroughs, Wellcome & Co., London, England, and New York.

Antistaphylococcus Serum is stated to be obtained from horses injected with killed cultures of staphylococcus pyogenes aureus, albus and citreus. Preserved with trikresol. Marketed in vials containing 25 to 50 Cc. Recommended in the treatment of various staphylococcus infections.

ANTISTREPTOCOCCUS SERUM.—Antistreptococcus serums are prepared by immunizing horses with virulent cultures of streptococci. Most manufacturers employ several strains of streptococci, thus obtaining polyvalent serums. In some cases humanized strains of streptococci are used; in others, cultures, the virulence of which has been

much increased by passage through animals. In a few cases both human and animal strains are employed. Some manufacturers employ horses immunized against diphtheria, making the doubtful claim that such serum is especially active in stimulating leukocytosis and phagocytosis.

Actions and Uses.—Antistreptococcus serum has been claimed to be useful in the treatment of streptococcus infections such as erysipelas, scarlet fever, puerperal septicemia, and tuberculosis (mixed infection). It has also been used as a prophylactic prior to surgical operations, after labor, in scarlet fever epidemics, etc. Its value is doubtful.

Hektoen, Weaver and Tunncliffe recently examined the preparations found on the American market; in a preliminary report (1) they state: "Streptococcus opsonins could not be demonstrated in any of the serums tested, and activation by fresh serums was not accomplished to any significant degree. When they were injected into rabbits, increase in streptococcus opsonins could not be demonstrated in the animal's serums in any notable degree, except in some instances. Attempts to obtain protective and curative effects from the injection of antistreptococcus serum in rabbits, guinea-pigs, and in a more limited scale in mice, met failure. The serums often seemed to reduce the natural resistance and to hasten death.

"It is our belief that the claims for the usefulness of antistreptococcus and antipneumococcus serums rest on impressions from results in clinical cases in man, and have in most cases no foundation whatsoever in experimental tests."

Antistreptococcus serum (liquid and desiccated) is recognized by the French pharmacopœia.

Burroughs, Wellcome & Co., London, England, and New York.

Polyvalent Antistreptococcus Serum is stated to be obtained from horses injected with killed cultures of a number of strains of cases of erysipelas, scarlet fever, puerperal fever, rheumatism, septicemia, angina, pneumonia and ulcerative endocarditis.

Antistreptococcus Serum (Erysipelas) is stated to be obtained from horses injected with killed cultures of a number of strains of streptococci obtained from cases of erysipelas.

Antistreptococcus Serum (Rheumatism) obtained from horses injected with killed cultures of a number of strains of streptococci obtained from cases of rheumatism.

Antistreptococcus Serum (Scarlatina) obtained from horses injected with killed cultures of a number of strains of streptococci obtained from cases of scarlet fever.

Antistreptococcus Serum (Puerperal Fever) obtained from horses injected with killed cultures of a number of strains of streptococci obtained from cases of puerperal fever.

All of the above are prepared with trikresol and are marketed in hermetically sealed vials containing in most cases 25 to 50 Cc.

Cutter Laboratory, Berkeley, Cal.

Polyvalent Streptococcal Serum, stated to be prepared by the injection of many strains of living cultures of streptococci into horses immunized with diphtheria toxin. Marketed in piston syringe containers, each containing 10 Cc. of serum.

Chemische Fabrik auf Actien, vorm. E. Schering, Berlin, Germany.
(Schering & Glatz, New York.)

Aronson's Antistreptococcus Serum, stated to be a polyvalent serum obtained by inoculating horses with streptococci the virulence of which has been highly exalted by animal passage and with various strains of streptococci. Preserved with 0.4 per cent. trikresol. Dose: 20 to 100 Cc., according to the severity of the case and the age of the patient.

Farbwerke vorm. Meister, Lucius & Bruening, Hoechst a. M., Germany (Farbwerke Hoechst Co., New York).

Antistreptococccic Serum, Hoechst, stated to be a polyvalent serum prepared by immunizing horses against streptococcus cultures of the most varied origin and with highly virulent passage cultures according to the method of Meyer and Ruppel. Contains no artificial preservatives. Dosage: 1 to 10 Cc. for immunization; 2 to 25 Cc. for single curative dose; 3 to 50 Cc. for double curative dose.

Lederle Antitoxin Laboratories, New York City. (Schieffelin & Co., New York.)

Antistreptococccic Serum Polyvalent; marketed in 10 Cc. syringes. Dose: as a prophylactic, 10 Cc.; curative, 20 to 100 Cc.

H. K. Mulford Co., Philadelphia.

Antistreptococccic Serum, stated to be the serum of horses which have been treated with streptococci of various strains. Marketed for immunizing purposes in syringes containing 10 Cc. and for therapeutic purposes in syringes containing 20 Cc. Dose: 20 to 30 Cc.

Parke, Davis & Co., Detroit, Mich.

Antistreptococccic Serum, stated to be a polyvalent serum; prepared by immunizing horses with killed cultures of streptococci; the latter are obtained from various human streptococcus infections and certain pathologic conditions common to animals. Preserved with trikresol. Marketed in 10 Cc. piston syringe containers, also in bulbs containing 10 Cc. each.

Frederick Stearns & Co., Detroit, Mich.

Streptolytic Serum, stated to be a composite and polyvalent serum; composite because it contains diphtheric antitoxin in addition to the streptococcus antibodies. Marketed in 10 Cc. syringes, some of which have attachments for subcutaneous injections, others for rectal injection.

ANTITUBERCLE SERUM.—

Parke, Davis & Co., Detroit, Mich.

Antitubercle Serum.—A serum prepared by treating horses for several months with the toxic products of the tubercle bacillus. Sated to be an experimental remedy claimed by some to give favorable results in tuberculosis. Marketed in 1, 2 and 4 Cc. bulbs and in 1-ounce bottles. Dose: 1 to 4 Cc. daily hypodermically.

ANTITYPHOID SERUM.—Antityphoid serum is a serum obtained from horses which have been injected with killed cultures of *Bacillus typhosus*.

Actions and Uses.—Antityphoid serum has been employed in the treatment of typhoid fever, but the evidence as to its value is conflicting.

Burroughs, Wellcome & Co., London, England, and New York.

Antityphoid Serum is stated to be obtained from horses injected with killed cultures of *Bacillus typhosus*. Marketed in hermetically sealed vials containing 25 to 50 Cc.

TETANUS ANTITOXIN.—(Antitetanic Serum and Antitetanic Globulins).—Antitetanic serum is the blood serum of horses immunized to the toxin of the tetanus bacillus. It is marketed in both liquid and dry forms. Some manufacturers prepare an antitetanic globulin; this contains a solution of the globulins of the blood, which are soluble in a saturated sodium chloride solution, together with the antitoxin, and contains the latter in concentrated form.

The antitetanic serum sold in interstate commerce in the United States should conform to the standard established by the United States Public Health Service. This standard is defined as follows (Treasury

Department Circular No. 61, Oct. 25, 1907; Bulletin 43, Hygienic Laboratory): "The immunity unit for measuring the strength of tetanus antitoxin shall be ten times the least quantity of antitetanic serum necessary to save the life of a 350-gram guinea-pig for ninety-six hours against the official test dose of a standard toxin furnished by the Hygienic Laboratory of the Public Health Service."

Uses.—Antitetanic serum is used both as a prophylactic and a curative agent in tetanus. The dried product may be used as a dusting powder.

Dose.—Immunizing, 1,500 units; in tetanus, 3,000 to 20,000 units every four to eight hours.

Serum antitetanicum is official in the Belgian, French and Swiss pharmacopœias. Both liquid and desiccated preparations are recognized by the French Pharmacopœia.

Department of Health, City of New York.

Antitetanic Globulin.—Preserved with chloroform. Marketed in vials containing 1,500 to 5,000 units.

Lederle Antitoxin Laboratories, New York City. (Schieffelin & Co., New York.)

Only the concentrated antitoxin (globulin) is marketed; this is offered in syringes containing from 1,500 to 5,000 units each.

H. K. Mulford Co., Philadelphia.

Tetanus Antitoxin. marketed in syringes containing 1,500 units (immunizing dose) and 3,000 and 5,000 units (therapeutic dose).

Parke, Davis & Co., Detroit, Mich.

Antitetanic Serum.—Marketed as follows:

1. In piston containers, 1,500 units.
2. In bulbs containing 1,500 units.
3. Dry.
4. Antitetanic Dusting Powder; the dried serum mixed with a small quantity of chloretone (chlorbutanol).

VACCINE VIRUS.—Vaccine virus is the material obtained from the skin eruptions of calves having vaccinia. The "pulp" is ground and mixed with varying percentages of glycerine. The latter has a certain degree of antiseptic action. It is usually marketed in capillary tubes or as glycerinated points. The serums which exude after the removal of the crusts have been used by some manufacturers for the preparation of "dry lymph points." These are generally regarded as unsatisfactory and the federal regulations forbid interstate traffic in them.

Some firms test the activity of their products on the cornea of rabbits and on calves.

Vaccine virus is official in the Belgian Pharmacopœia under the name "Vaccinum;" in the Swiss as "Virus Vaccinum."

H. M. Alexander & Co., Marietta, Pa.

Marketed as "glycerinated lymph" in capillary tubes; also as "glycerinated vaccine points" and as "dry points."

Cutter Laboratory, Berkeley, Cal.

Marketed in two forms: ivory points (dry) and in capillary tubes.

Lederle Antitoxin Laboratories, New York City. (Schieffelin & Co., New York.)

Glycerinated Vaccine Virus: (a) in glass capillary tubes and in bulk (for 10, 20 or 50 vaccinations); (b) upon Lederle's Protected Ivory Points; the latter are contained in capsule-like glass tubes which do not require breaking.

H. K. Mulford Co., Philadelphia.

Glycerinated Vaccine Lymph.—In sealed capillary tubes. Glycerinated Glass Vaccine Points; glycerinated lymph on sterile glass points.

National Vaccine and Antitoxin Institute, Washington, D. C.

Glycerinated Vaccine Virus.—Marketed in capillary tubes; Glycerinated Vaccine Virus on Ivory Points; special capsule.

Parke, Davis & Co., Detroit, Mich.

Glycerinated Vaccine: (a) in capillary tubes, (b) on ivory points. The points are contained in sealed glass tubes provided with Lee's breakable ring so that they may be opened without difficulty.

The Slee Laboratories, Swiftwater, Pa. (Abbott Alkaloidal Co., Chicago.

Glycerinated Vaccine Virus.—Marketed in packages containing respectively five and ten capillary tubes.

BACTERIAL VACCINES.

Bacterial vaccines (cf. also tuberculin) are suspensions of the killed bacteria in physiologic salt solution; phenol (0.5 per cent.) is usually added as a preservative. Being suspensions, there is a tendency for the bacteria to settle on standing; hence the vial should be shaken before the syringe is filled and the latter should be shaken before injecting.

Pharmacopoeial Preparations.—The French Pharmacopoeia contains a "Vaccine antipesteux," consisting of a suspension of killed plague bacilli and a "Vaccin antipesteux sensibilisé," prepared by treating killed plague bacilli with antiplague serum. (Antiplague Serum is also official in the French Pharmacopoeia.)

Actions and Uses.—The use of many of these vaccines is in the experimental stage. Bacterial vaccines are often prepared from cultures obtained from the individual to be treated (autogenous vaccines); these usually give the best results. In fact some authors maintain that "stock" vaccines should be used only when it is impracticable to secure the autogenous agent.

Bacterial vaccines are used to aid the production of an active immunity. Great care and skill are necessary for their proper use and no definite statements as to dosage, etc., can be given; the physician must be guided by the condition of the patient and the manner in which the latter reacts to the treatment. Bacterial vaccines should be used only when bacteriologic examination has demonstrated the infecting organism. In the majority of instances reliance should not be placed on vaccines alone, but other forms of treatment should also be employed.

ACNE VACCINE.—A vaccine prepared from acne bacilli (*Bacillus acnes*). Said to be useful in the milder forms of acne.

The Abbott Laboratories (The Abbott Alkaloidal Co.), Chicago.

Acne Bacterin, Polyvalent.—Marketed in packages of six ampoules, each containing 50 million killed *Bacillus Acne*.

Cutter Laboratory, Berkeley, Cal.

Acne Bacillus Vaccine.—*Acne Bacillus Bacterin.*—Each Cc. contains 50 million killed acne bacilli suspended in physiologic salt solution with 4/10 per cent. trikresol. Dose, from 5 to 50 million killed bacteria.

Greeley Laboratories, Inc., Boston, Mass.

Acne Vaccine.—It is marketed in six graduated doses, containing respectively 1, 3, 5, 8, 10 and 12 millions of bacteria killed by heat; put up in hypodermic containers.

Lederle Antitoxin Laboratories, New York City. (Schleffelin and Co., New York.)

Acne Vaccine.—This product is marketed in five syringes containing respectively 5 million, 10 million, 20 million, 40 million and 100 million killed acne bacteria. Also marketed in four packages of two vials, each containing 5 million, 10 million, 20 million and 40 million killed bacteria. Also marketed in 20 Cc. vials in four strengths, 1 Cc. containing respectively 5 million, 10 million, 20 million and 40 million acne bacilli.

H. K. Mulford Co., Philadelphia.

Acne-Bacterin.—This product is marketed in four syringes containing, respectively, 25 million, 50 million, 100 million and 200 million killed acne bacilli, sold in a package or as separate syringes. Also marketed in packages of four 1 Cc. ampoules, each containing 50,000,000 killed bacteria, and in 20 Cc. vials, each Cc. containing 50,000,000 killed bacteria.

Dose.—Initially 5 to 25 millions.

Parke, Davis & Co., Detroit, Mich.

Acne Vaccine.—This product is marketed in four bulbs, each bulb containing 100 million bacteria sterilized with heat and ready for use. The package is marked with the date up to which the product should retain its full labeled strength.

E. R. Squibb & Sons, New York City.

Polyvalent Acne Vaccine.—Marketed in packages of six ampoules containing 5 million, 10 million, 25 million, 50 million, 100 million and 200 million killed bacteria.

BACILLUS COLI VACCINE.—*Bacillus coli* vaccine seems to cause distinct improvement in certain infections of the urinary and biliary tracts due to the colon bacillus. Pain and frequency of micturition are said to be quickly relieved, but complete elimination of the bacteria is rare. It has also been used in gall bladder and other abdominal fistulas where there was an infection with the colon bacillus.

The Abbott Laboratories (The Abbott Alkaloidal Co.), Chicago.

Coli-Bacterin, Polyvalent.—Marketed in packages of six ampoules, each containing 100 million killed *Bacillus Coli Communis*.

Cutter Laboratory, Berkeley, Cal.

Coli Vaccine.—A suspension of the *Bacillus coli communis* in physiologic salt solution with 4/10 per cent. trikresol. Containing 50 million killed *Bacilli coli* per Cc. Dosage from 10 to 100 million.

Greeley Laboratories, Inc., Boston, Mass.

Colon Vaccine.—It is marketed in six graduated doses containing respectively 25, 75, 200, 400, 650 and 1,000 millions of bacteria killed by heat; put up in hypodermic containers.

Lederle Antitoxin Laboratories, New York City. (Schleffelin and Co., New York.)

Colon Vaccine, Polyvalent.—Marketed in 1 Cc. vials and in syringes containing respectively 50 million, 100 million, 200 million and 400 million killed bacteria. Also marketed in 20 Cc. vials in four strengths, 1 Cc. containing respectively 50 million, 100 million, 200 million and 400 million killed bacilli.

H. K. Mulford Co., Philadelphia.

Coli-Bacterin.—Marketed in 1 Cc. vials; each Cc. is said to contain approximately 50,000,000 killed bacilli suspended in normal salt solution. Also in 20 Cc. vials, each Cc. containing 50,000,000 killed bac-

teria. Also in 4 syringes containing respectively 25,000,000, 100,000,000, 200,000,000 and 400,000,000 killed bacteria, sold in a package or as separate syringes. The initial dose is from 10,000,000 to 50,000,000.

Parke, Davis & Co., Detroit.

Colon Vaccine.—This product is marketed in four bulbs. Each bulb contains 200 million bacteria sterilized with heat and ready for use. The package is marked with the date up to which the product should retain its full labeled strength.

G. H. Sherman, Detroit.

Colon Bacillus Vaccines.—Marketed in two strengths: 1. Each Cc. contains about 40,000,000 killed bacilli. 2. Each Cc. contains about 100,000,000 killed bacilli.

S. R. Squibb & Sons, New York City.

Polyvalent B. Coli-Communis Vaccine.—Marketed in packages of six ampoules containing respectively 100 million, 500 million and 1,000 million killed bacteria.

BACILLUS PESTIS VACCINE.—This vaccine is claimed to be of value as a prophylactic against infection by plague.

H. K. Mulford Co., Philadelphia.

Plague Bacterin.—Marketed as follows: I. Single-dose vaccination in 1 Cc. ampoules. Standardized to contain 5 billion killed *B. pestis* (plague bacilli) in each Cc. II. Ten single-dose vaccinations in one 10 Cc. ampoule. Standardized to contain 5 billion killed plague bacilli in each Cc. III. Single two-dose vaccination in two 1 Cc. ampoules. Two vaccinations are used for one immunization. The first dose (red label) is standardized to contain 1 billion and the second dose (white label) to be injected from seven to ten days later, or when the reaction to the first injection has subsided, is standardized to contain 2 million killed *B. pestis* in each Cc. IV. Ten two-dose vaccinations in two 10 Cc. ampoules. Each Cc. of ampoule with red label, marked "First vaccination," is standardized to contain 1 billion killed *B. pestis*. Each Cc. of ampoule with white label, marked "Second vaccination," is standardized to contain 2 billion killed *B. pestis*.

BACILLUS PYOCYANEUS VACCINE.—This is said to be useful in local infections in which this organism is present. A recent writer states that he has never experienced the slightest beneficial effect either from the autogenous or stock vaccines prepared from this organism, and considers its use illogical.

H. K. Mulford Co., Philadelphia.

Pyocyano-Bacterin.—This product is marketed in four syringes containing, respectively, 25 million, 100 million, 200 million and 400 million killed bacteria, sold in a package or as separate syringes. Also in packages of four 1 Cc. ampoules, each containing 50 million killed bacteria. Also in 20 Cc. vials, each Cc. containing 50 million killed bacteria. The initial dose is 10 million to 50 million.

CHOLERA VACCINE.—Cholera vaccine consisting of attenuated living vibrios of different virulence has been used with considerable success in India by Haffkine. The living vibrios have been replaced by Kolle by emulsions of killed bacteria and statistics appear to show that this form of vaccine is fairly efficient in the prevention of cholera.

H. K. Mulford Co., Philadelphia.

Cholera Bacterin.—(Cholera vaccine.)—This bacteria is designed for the purpose of immunization against cholera.

Cholera-bacterin is marketed in packages of three syringes: syringe 1 is said to contain 500 million killed cholera vibrios, while syringes 2 and 3 each contain 1,000 million killed vibrios.

FRIEDLAENDER VACCINE.—A vaccine prepared from the Friedlaender bacillus. It is said to be useful in chronic nasal catarrh and chronic bronchitis when due to the Friedlaender bacillus.

H. K. Mulford Co., Philadelphia.

Friedlaender Bacteria.—This product is marketed in packages of four syringes, containing, respectively, 50 million, 100 million, 200 million and 400 million killed Friedlaender bacilli. The single syringes may be obtained separately. Also marketed in packages of four 1 Cc. ampoules, each containing 50 million killed bacteria. Also in 20 Cc. vials, each containing 50 million killed bacteria.

GNOCOCCUS VACCINE.—Gonococcus vaccine has been used with considerable success in subacute and chronic gonococcus infections involving the joints, and with variable results in infections of the prostate, vagina, etc. There is more justification for the employment of stock vaccines of gonococci than of many other organisms, owing to the difficulty of producing an autogenous vaccine unmixed with other organisms.

Cutter Laboratory, Berkeley, Cal.

Gonococcal Vaccine.—Marketed in 1 Cc. vials, each Cc. containing about 50 million cocci suspended in physiological salt solution with 0.4 per cent. trikresol.

H. K. Mulford Co., Philadelphia.

Neisser Bacteria.—Each Cc. is said to contain approximately 50 million killed gonococci preserved by 0.5 per cent. phenol. Marketed in four syringes containing, respectively, 50 million, 100 million, 200 million and 400 million killed gonococci, sold in a package or as separate syringes. Also in packages of four 1 Cc. ampoules, each containing 50 million killed gonococci; in packages of four 1 Cc. ampoules, each containing 500 million killed gonococci; in 20 Cc. vials, each containing 50 million killed gonococci, and in 20 Cc. vials, each Cc. containing 500 million killed gonococci.

Neisser Bacteria Mixed.—Each Cc. is said to contain approximately 100 million each of killed staphylococcus (aureus, albus and citreus) and 50 million each of streptococci, B. coli, B. pseudodiphtheriae and gonococci. It is marketed in packages of four 1 Cc. ampoules. Also marketed in vials of 20 Cc. and in 4 syringes. Syringe A being of the composition mentioned above and constituting the initial dose, while Syringes B, C and D contain, respectively, 2, 4 and 8 times the amount of bacteria contained in Syringe A.

National Vaccine and Antitoxin Institute, Washington, D. C.

Gonococcal Vaccine.—Marketed in syringes, each said to contain 2 million to 50 million bacteria; sterilized by heat.

Parke, Davis & Co., Detroit, Mich.

Gonococcus Vaccine.—P. D. & Co.—Marketed in bulbs each said to contain 20 million bacteria; sterilized by heat.

Gonorrheal Vaccine (Combined).—This product is marketed in four bulbs. Each bulb contains micrococcus gonorrhoeae 500 million and staphylococcus albus, aureus and citreus 400 million bacteria, sterilized with heat and ready for use. The package is marked with the date up to which the product should retain its full labeled strength.

G. H. Sherman, Detroit.

Gonococcus Vaccines.—Marketed in two strengths: 1. Each Cc. containing 20 million killed bacteria. 2. Each Cc. containing 100 million killed bacteria.

Gonococcus and Staphylococcus Albus Vaccine.—A mixed vaccine containing in each Cc. gonococcus 100 million and staphylococcus albus 400 million.

MENINGOCOCCUS VACCINE.—A vaccine believed to be useful in immunizing against the meningococcus of Weichselbaum.

H. K. Mulford Co., Philadelphia.

Meningo-Bacterin.—This product is marketed in three strengths, each dose containing respectively 500 million, 1,000 million and 1,000 million killed meningococci. For the first injection 500 million killed meningococci are used and the second and third injections are made at ten-day intervals. The preparation is put up in two styles: (a) in syringes containing each dose in a separate syringe intended for the immunization of one individual and (b) in packages containing thirty ampoules of ten complete immunizing doses. The successive doses are distinguished by red, white and blue labels. No syringe is contained in this package.

MICROCOCCLUS NEOFORMANS VACCINE.—*Micrococcus neoformans* vaccine is claimed to be beneficial in ulcerated tumors in which this organism occurs as a secondary infection.

H. K. Mulford Co., Philadelphia.

Neoformans-Bacterin.—Each Cc. is said to contain approximately 50 million killed neoformans micrococci. Marketed in 4 syringes containing respectively 50 million, 100 million, 200 million and 400 million killed neoformans micrococci, sold in a package or as separate syringes. Also in packages of four 1 Cc. ampoules, each containing 50 million killed neoformans micrococci. Also in 20 Cc. vials, each containing 50 million killed neoformans micrococci.

MIXED VACCINES.—

H. K. Mulford Co., Philadelphia.

Staphylo-Strepto-Bacterin Mixed.—Marketed in a package of four syringes: Syringe A. A mixed vaccine containing about 50 million killed *staphylococcus pyogenes aureus*, 50 million killed *staphylococcus pyogenes albus* and 25 million killed *streptococcus*. Syringe B. A mixed vaccine containing about 100 million killed *staphylococcus pyogenes aureus*, 100 million killed *staphylococcus pyogenes albus* and 50 million killed *streptococcus*. Syringe C. A mixed vaccine containing about 200 million killed *staphylococcus pyogenes aureus*, 200 million killed *staphylococcus pyogenes albus* and 100 million killed *streptococcus*. Syringe D. A mixed vaccine containing about 400 million killed *staphylococcus pyogenes aureus*, 400 million killed *staphylococcus pyogenes albus* and 200 million killed *streptococcus*.

Parke, Davis & Co., Detroit, Mich.

Combined Bacterial Vaccine.—This product is marketed in four bulbs. Each bulb contains 750 million bacteria of mixed *streptococcus pyogenes*, *staphylococcus pyogenes aureus*, *staphylococcus pyogenes albus*, *staphylococcus pyogenes citreus*, *bacillus coli communis* and *diplococcus pneumonia*, sterilized with heat and ready for use. The package is marked with the date up to which the product should retain its full labeled strength.

PNEUMOCOCCUS VACCINE.—*Pneumococcus* vaccine has been claimed to be useful in pneumococcal infections. There is no good evidence of the value of pneumococcus vaccine in acute pneumonia. Its value in chronic infections is still in dispute.

H. K. Mulford Co., Philadelphia.

Pneumo-Bacterin.—Each Cc. is said to contain about 50 million killed pneumococci. Marketed in packages of 4 syringes containing respectively 50 million, 100 million, 200 million and 400 million killed pneumococci. The single syringes may be obtained separately. Also marketed in packages of four 1 Cc. ampoules, each containing 50 million killed pneumococci. Also in 20 Cc. vials, each containing 50 million killed pneumococci.

Pneumo-Bacterin Mixed.—Each Cc. is said to contain 50 million killed pneumococci, 25 million killed streptococci and 50 million killed staphylococci. Also marketed in vials of 20 Cc. and in packages of 4 syringes, Syringe A being of the composition mentioned above and constituting the initial dose, while Syringes B, C and D contain, respectively, 2, 4 and 8 times the amount of bacteria contained in Syringe A.

STAPHYLOCOCCUS VACCINES.—These have been used with much success in localized surface infections due to staphylococci, such as acne, boils, carbuncles, etc. In wounds, sinuses, chronic osteomyelitis, etc., their value is not so plain. The best results are obtained with autogenous vaccines.

Cutter Laboratory, Berkeley, Cal.

Staphylococcus Vaccine.—Each Cc. contains about 500 million cocci preserved with 0.4 per cent. trikresol.

H. K. Mulford Co., Philadelphia.

Five varieties of vaccine are offered:

1. **Staphylo-Albus Bacterin.**—From staphylococcus pyogenes albus.
2. **Staphylo-Aureus Bacterin.**—From staphylococcus pyogenes aureus.
3. **Staphylo-Bacterin.**—Containing a mixed culture of staphylococcus albus, aureus and citreus.
4. **Staphylo-Acne-Bacterin.**—A mixed vaccine prepared from cultures of staphylococcus albus, aureus, and citreus with bacillus acnes. All of the above are marketed in packages of 4 syringes containing, respectively, 250 million, 500 million, 1 billion and 2 billion killed staphylococci. The syringes of staphylo-acne bacterin contain in addition, respectively, 25 million, 50 million, 100 million and 200 million acne bacilli. The single syringes may be obtained separately. Staphylo-bacterin, staphylo-albus bacterin, staphylo-aureus bacterin are also marketed in packages of four 1 Cc. ampoules, each containing 250 million killed bacteria. These three are also marketed in packages of four 1 Cc. ampoules, each containing 1 billion killed bacteria.

Staphylo-bacterin and staphylo-aureus bacterin are also marketed in 20 Cc. vials, each Cc. containing 250 million killed bacteria.

Staphylo-bacterin is also marketed in 20 Cc. vials, each Cc. containing 1 billion killed bacteria.

Staphylo-acne bacterin is also marketed in four 1 Cc. ampoules, each containing 300 million killed staphylococci and 50 million killed acne bacilli.

Staphylo-acne bacterin is also marketed in 20 Cc. vials, each containing 300 million killed staphylococci and 50 million killed acne bacilli.

Staphylo-Bacterin Mixed.—Staphylo-bacterin mixed is composed of a suspension of bacteria, each Cc. of which contains 25 million killed streptococci, 100 million killed staphylococci and 50 million killed B. coli.

It is marketed in packages of four 1 Cc. ampoules, each Cc. of the composition given above. Also in 20 Cc. vials. Also in packages of 4 syringes, Syringe A being of the composition given above, while Syringes B, C and D contain, respectively, 2, 4 and 8 times the amount of bacteria contained in Syringe A.

Parke, Davis & Co., Detroit, Mich.

Four forms of vaccines are offered:

1. From staphylococcus pyogenes albus.
2. From staphylococcus pyogenes aureus.
3. From staphylococcus pyogenes citreus.
4. From the three preceding combined.

Each Cc. contains about 400 million bacteria.

Furunculosis Vaccine.—This product is marketed in four bulbs. Each bulb contains staphylococcus pyogenes aureus 400 million bacteria sterilized with heat and ready for use. The package is marked with the date up to which the product should retain its full labeled strength.

G. H. Sherman, Detroit.

Staphylococcus Pyogenes Albus Vaccine.—Each Cc. contains about 300 million staphylococcus pyogenes albus.

Staphylococcus Pyogenes Aureus Vaccine.—Each Cc. contains about 300 million staphylococcus pyogenes aureus.

Staphylococcus Pyogenes Albus and Aureus Vaccines.—Marketed in four forms: 1. A mixed vaccine containing in each Cc. staphylococcus pyogenes albus and aureus each 100 million. 2. A mixed vaccine containing in each Cc. staphylococcus pyogenes albus and aureus each 200 million. 3. A mixed vaccine containing in each Cc. staphylococcus pyogenes albus and aureus each 300 million. 4. A mixed vaccine containing in each Cc. staphylococcus pyogenes albus 400 million and staphylococcus pyogenes aureus 200 million.

Staphylococcus Pyogenes Albus, Aureus and Citreus Vaccine.—A mixed vaccine containing in each Cc. staphylococcus pyogenes albus, aureus and citreus each 100 million.

Streptococcus Pyogenes, Pneumococcus and Staphylococcus Pyogenes Aureus Vaccine.—A mixed vaccine containing in each Cc. streptococcus pyogenes 30 million, pneumococcus 40 million and staphylococcus pyogenes aureus 150 million.

STREPTOCOCCUS VACCINE.—Recommended in various infections by streptococci.

H. K. Mulford Co., Philadelphia.

Scarlatina-Bacteria (Scarlet Fever Vaccine).—It consists of a suspension of killed streptococci obtained from scarlet fever cases. It is marketed in packages of 4 syringes, Syringe A containing 50 million killed streptococci, while Syringes B, C and D contain, respectively, 2, 4 and 8 times the amounts of bacteria contained in Syringe A. The initial dose is from 10 million to 50 million.

Scarlatina-bacterin is also marketed for immunizing purposes in packages of 3 syringes, Syringe No. 1 containing 250 million killed streptococci and constituting the first dose, while Syringes No. 2 and No. 3, consisting, respectively, of the second and third doses, to be injected at intervals of seven days following the first dose, contain 2 and 4 times the amount of bacteria in Syringe No. 1.

Also marketed in vials of 20 Cc., each Cc. containing 500 million killed streptococci and sufficient for immunizing 5 persons.

Strepto-Bacterin.—Each Cc. contains about 50 million killed streptococci. Marketed in 4 syringes containing respectively 50 million, 100 million, 200 million and 400 million killed streptococci, sold in a package or as separate syringes. Also in packages of 4 1 Cc. ampoules, each Cc. containing 50 million killed streptococci. Also in 20 Cc. vials, each Cc. containing 50 million killed streptococci.

Parke, Davis & Co., Detroit, Mich.

Streptococcus Vaccine.—Each Cc. contains about 40 million streptococci pyogenes.

G. H. Sherman, Detroit.

Streptococcus Erysipelatis Vaccine.—Each Cc. contains about 20 million killed streptococci erysipelatis.

Streptococcus Pyogenes Vaccine.—Marketed in two strengths: 1. Containing in each Cc. 30 million killed streptococci. 2. Containing in each Cc. 60 million killed streptococci.

Streptococcus Pyogenes and Micrococcus Catarrhalis Vaccine.—A mixed vaccine containing in each Cc. streptococcus pyogenes 30 million and micrococcus catarrhalis 100 million.

Streptococcus Pyogenes, Staphylococcus, Pyogenes Aureus and Albus Vaccine.—A mixed vaccine containing in each Cc. streptococcus pyogenes 30 million and staphylococcus pyogenes aureus and albus each 100 million.

Streptococcus Pyogenes and Colon Bacillus Vaccine.—A mixed vaccine containing in each Cc. streptococcus pyogenes 30 million and colon bacillus 40 million.

Streptococcus Pyogenes, Staphylococcus Pyogenes Aureus and Albus Vaccine.—A mixed vaccine containing in each Cc. streptococcus pyogenes 60 million, staphylococcus pyogenes albus and aureus each 200 million.

TYPHOID VACCINE.—Inoculations with typhoid vaccines have been practiced extensively in various armies; the results, both as regards the morbidity and the mortality from typhoid fever have been distinctly favorable. Such inoculations are recommended in institutions where many of the personnel are not infrequently exposed to typhoid infection and in communities threatened with or affected by typhoid epidemics. Typhoid vaccines are sometimes of value in the treatment of typhoid carriers. For this purpose they should be autogenous.

H. K. Mulford Co., Philadelphia.

Typho-Bacterin.—Each Cc. contains about 50 million killed bacilli. Marketed in 4 syringes containing respectively 125 million, 250 million, 500 million and 1 billion killed typhoid bacilli, sold in a package or as separate syringes. Also in packages of four 1 Cc. ampoules, each con-

taining 50 million killed typhoid bacilli. Also in 20 Cc. vials, each Cc. containing 50 million killed typhoid bacilli.

Typho-Bacterin Immunizing.—The immunizing package of typho-bacterin contains 3 syringes, Syringe No. 1 containing 500 million killed typhoid bacilli, while Syringes Nos. 2 and 3 each contain 1,000 million killed typhoid bacilli. The contents of these syringes should be injected subcutaneously at intervals of ten days. Also marketed in hospital-size packages of 30 ampoules, in sets of three, each set being sufficient for the complete immunization of one patient.

Typho-Bacterin Mixed.—It is marketed in packages of three syringes; Syringe 1 is said to contain 500 million killed *Bacillus typhosus* and 250 million each of *Bacillus paratyphosus* A and B, while Syringes 2 and 3 each contain twice the number of killed bacilli contained in Syringe 1.

Parke, Davis & Co., Detroit, Mich.

Typhoid Vaccine (Prophylactic).—This product is marketed in bulbs. Each bulb contains bacillus typhosus 1,000 million bacteria sterilized with heat and ready for use. The package is marketed with the date up to which the product should retain its full labeled strength.

G. H. Sherman, Detroit.

Typhoid Bacillus Vaccine.—Marketed in three forms: 1. Each Cc. contains about 50 million killed typhoid bacilli. 2. Each Cc. contains about 500 million killed typhoid bacilli. 3. Each Cc. contains about 1 billion killed typhoid bacilli.

TUBERCULIN PREPARATIONS.

Tuberculin represents the toxins of the tubercle bacillus. They may be in the form of a filtered extract of the bacilli or may be composed of the pulverized insoluble substance of the bacilli themselves. In the latter, or emulsified form, tuberculin is known as tubercle vaccine, and might be classed with the "Bacterial Vaccines" (which see). Tuberculin are therefore of two general classes:

1. Those prepared from the germ-free culture media, and containing for the most part only soluble products of the bacillus. This class includes Tuberculin "old" (or Tuberculin Koch) and Tuberculin Denys (Bouillon Filtré).

2. Those which contain the greater part of the germ body itself; they include the new tuberculin of Koch ("T. R." and the "New Tuberculin Koch [Bacillus emulsion]").

Actions and Uses.—The different modifications and preparations of tuberculin are practically identical in their physiologic effects. They vary chiefly in a quantitative way and in absorbability. They are used both for diagnostic and therapeutic purposes:

Diagnostic Use.—"Tuberculin depends for its diagnostic value on a special sensitiveness acquired by the tissues after a tuberculous infection. This sensitiveness is manifested by an inflammatory response when tuberculin is brought in contact with the skin or mucous membrane."¹ The original tuberculin of Koch is considered the most satisfactory preparation for diagnosis but other filtered extracts are suitable. There are four principal methods of applying the test: 1. The Cutaneous Test (von Pirquet); 2. The Inunction Test (Moro); 3. The Conjunctival Test (Calmette, Wolff-Eisner); 4. The Subcutaneous Test. The proper performance and correct interpretation of these tests require much knowledge and experience. Some of them, notably the conjunctival and subcutaneous tests, may, under certain circumstances and in the hands of inexperienced or careless persons, do much harm.

Use in Therapeutics.—The successful employment of tuberculin in therapeutics depends upon a thorough knowledge of the disease and

¹Baldwin: The Journal A. M. A., 1910, liv, 260.

the individual patient; in many cases its use may do much harm. Baldwin¹ states the general principle involved as follows:

"The therapeutic use of tuberculin may have two fairly definite objects in view: One is to diminish the sensitiveness to the toxins—the other is to create intermittent local reactions and thus to stimulate the disease focus to heal or become absorbed. The possibility of the production of a recognizable immunity to the disease thus far by any form of tuberculin treatment is open to question. A certain degree of resistance is indirectly accomplished when sensitiveness to tuberculin is decreased to a marked degree, accompanied by constitutional improvement. Such specific resistance as can be obtained by tuberculin is gradually lost after the treatment is discontinued, so that statements that patients can be made 'immune' are unjustified."

As regards the choice of tuberculin and the method of administration Baldwin says:

"For therapeutic use the choice chiefly lies between the solutions and emulsions or vaccines. Opinions are too variant to permit the formulation of rules. In general the dosage is more controllable with solutions, and reactions are less frequent from emulsions." "Owing to the uncertain absorption of emulsions, reactions may ensue unexpectedly if the dose is increased greatly. The solutions are therefore safer for tuberculin immunization until some accurate standards for determining the dosage shall be made. The dosage is at present empirical; each individual case must be an experiment, and the symptoms carefully observed before each dose. The subcutaneous injection is the only satisfactory method for the administration of tuberculin. Tuberculin pills or capsules for stomach ingestion and suppositories per rectum are too uncertain of absorption to warrant any recommendation. Inunctions of tuberculin have a possible field in treatment of skin tuberculosis; otherwise they are also impracticable."

The directions given by some manufacturers as to the method of using and the conclusions to be drawn from the use of their preparations seem to the Council to be open to criticism in certain respects. Thus many firms enclose droppers for use in making dilutions; droppers are not sufficiently accurate for use with strong solutions. Pipettes, accurately calibrated in the metric system, should be used.

The use of ready-made "serial dilutions" as a routine practice is not to be commended. Such solutions deteriorate rapidly, especially in the presence of phenol or trikresol and the rate of such deterioration may not be the same in different dilutions; competent authorities think it desirable to limit the use of dilutions to one month or even less in the case of soluble tuberculins. Some firms state the date of manufacture on the labels; it is desirable that this should be done in all cases. Sufficient precautions are often not given as to the care necessary in passing from a weak to a stronger solution.

The dangers from the use of tuberculin in the eye are not sufficiently emphasized by some firms.

The "conclusions" which some manufacturers state may be drawn from a "positive reaction" seem to the Council to be in some cases stated too dogmatically.

Pharmacopœial Preparations.—Koch's "old tuberculin" is official in the German Pharmacopœia under the name "Tuberkulinum-Kochi, Tuberkulin;" in the Belgian under the name "Tuberculinum;" in the Swiss under the name "Tuberkulinum Concentratum;" and in the French under the name "Tuberculine Brute." The French and Swiss Pharmacopœias contain also diluted tuberculin ("Tuberkulinum Normale Dilutum" of the Swiss, "Tuberculine Diluée" of the French Pharmacopœia), prepared by diluting 1 Cc. of the concentrated tuber-

¹Baldwin: The Journal A. M. A., 1910, liv, 260.

culin with 10 Cc. of 0.5 per cent. phenol. The French Pharmacopœia contains also a "Tuberculine Solide Purifiée" prepared by precipitating the "Tuberculine Brute" with ten times its volume of 80 per cent. alcohol, washing the precipitate with ether and drying in vacuo. For use 0.01 Gm. of this is dissolved in 100 Gm. distilled water.

OLD TUBERCULIN, "O. T." (Tuberculin Originale, "T. O."; Tuberculin Koch).

Old Tuberculin is prepared by evaporating a 6 to 8 weeks' bouillon culture of tubercle bacilli at boiling temperature to 1/10 of its volume and filtration through clay or porcelain. A clear, syrupy, amber-colored fluid; containing about 50 per cent. glycerine.¹ Frequently marketed in "serial dilutions" by which the doses may be gradually increased.

H. M. Alexander & Co., Marietta, Pa.

Original Tuberculin "O. T." (Koch).—Marketed in 1 and 3 Cc. vials. Tuberculin for the Cutaneous Test (von Pirquet).—A solution of tuberculin original in capillary tubes. Solutions of two strengths, one for children and one for adults, are prepared.

Tuberculin Ointment Capsules (for the Moro Test).—Consist of equal parts by weight of Koch's Old Tuberculin and anhydrous wool fat. Marketed in capsules.

Tuberculin for the Ophthalmic Test.—Tuberculin Precipitatum, "T. P." Prepared by precipitation with 95 per cent. alcohol from Koch's Old Tuberculin. Marketed in tubes in solutions of two strengths (0.5 per cent. and 1 per cent.).

Dixon's Tubercle Bacilli Extract.—(See "Fluid of Dixon," Medical News, January 17, 1891). An extract of tubercle bacilli dissolved in normal saline solution. Marketed in syringes containing the extract from 1 mg. bacilli. The standard therapeutic dose is a weekly injection of the contents of 1 syringe, to be reduced in amount and frequency if the patient shows signs of reaction.

Cutter Laboratory, Berkeley, Cal.

Tuberculin O. T. (Dilution) von Pirquet's Reaction.—Marketed in packages containing ten capillary tubes and one ejecting bulb.

Tuberculin Old (Tuberculin O. T.).—In 1 Cc. vials, preserved with trikresol; for use in solutions only. Also in serial dilutions; the latter packages containing 5 bottles each holding about 8 Cc., ranging from 0.01 to 100 mg. per Cc.

Tuberculin O. T. Bovine.—Made by the same process as the foregoing except that the organism used is of the bovine type.

Tuberculin, Koch (concentrated).—For the cutaneous reaction; in capillary pipettes.

Tuberculin, Purified.—1 per cent. solution, for the ophthalmic reaction.

Tuberculin Ointment (Moro Ointment).—A mixture of 50 per cent. each anhydrous wool fat and Tuberculin O. T., human strain. Dose, varying amounts, usually about 0.2 Gm.

Tuberculin for the Thermal Reaction.—Each Cc. contains 1 mg. Tuberculin, O. T.

Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a. M., Germany. (Farbwerke Hoechst Co., New York.)

Tuberculin "Koch" (Old).—Marketed in vials containing 1 Cc., 5 Cc. or 50 Cc.

Tuberculosis Diagnostic "Hoechst."—Dried tuberculin free from glycerine, prepared from Tuberculin Koch (Old Tuberculin). To be used in 0.1 per cent. solutions for the tuberculo-ophthalmic reaction.

Tuberculosis Diagnostic "Hoechst" Dry in Tubes.—Each tube contains 0.005 Gm. (1/10 grain).

Dosage.—The contents of a tube are dissolved in 5 Cc. of cold sterile water.

Tuberculosis Diagnostic "Hoechst" 0.1 per cent. solution.

Dosage.—The contents of the tube are ready for use.

Bovine Tuberculin.—Tuberculin corresponding to Tuberculin "Koch"

¹Some firms add trikresol to their preparations of this tuberculin; the necessity or advisability of this is considered questionable if the glycerine is of the proper strength. It is stated that trikresol will, in the course of time, weaken the tuberculin.

Old, but prepared from bovine bacilli. Marketed in bottles containing 1 Cc. or 5 Cc.

Tuberculin Gesellschaft, St. Petersburg, Russia. (Morgenstern & Co., New York.)

Endotin.—*Tuberculinum Purum*. Endotin is the purified extract of a filtered culture of human bacilli in 50 per cent glycerine.

Endotin is prepared exactly as Koch's "Old" tuberculin, but is subsequently treated with alcohol, ether, chloroform and xylol in order to eliminate the deuterioalbumoses present.

Tuberculinum purum is now supplied in a carton of 4 series which are intended to represent a course of tuberculin treatment. Each series consists of 7 ampoules.

H. K. Mulford Co., Philadelphia.

Tuberculin "Old" (O. T.).—Marketed in 1 Cc. vials; also in serial dilutions in 5 vials of 8 Cc. each progressing by doses of 2 minims containing 0.001 mg. to 2 minims containing 10 mg.; in rectal suppositories containing from 1 to 500 mg. tuberculin in cacao butter.

Von Pirquet Test for Tuberculosis.—Old tuberculin marketed in capillary tubes in packages of three and of ten. Each tube contains old tuberculin sufficient for one test.

Tuberculin Ointment.—An ointment consisting of 50 per cent. of tuberculin "Old" with an equal part of *adeps lanæ hydrosus*.

Parke, Davis & Co., Detroit, Mich.

Tuberculin "Old" (Koch).—Marketed in 0.5 Cc. bulbs.

Tuberculin Discs for the Ophthalmic Reaction.—Prepared by precipitating concentrated tuberculin with alcohol. Each disc contains 3.3 mg. tuberculin, which when dissolved in 0.3 Cc. (5 minims) of water makes a 1 per cent. solution.

TUBERCULIN.—Rosenbach.

Cultures of the tubercle bacillus are allowed to grow for about two months, after which they are inoculated with *Trichophyton holosericum album*, which is allowed to grow in conjunction with the tubercle bacillus for from eight to twelve days at a temperature of about 20-22° C. The culture mass consisting of the tubercle bacilli and fungus mycelium is now removed from the nutrient medium, is ground with a solution containing 10 per cent. of glycerine and 0.5 per cent. of phenol, filtered, and the filtrate evaporated in a vacuum until its volume is about five times that of the culture mass.

The fluid nutrient is absorbed by pieces of potato, ground, filtered and concentrated as above described. The two extracts thus obtained are mixed in equal proportions, and an amount of 0.5 per cent. solution of phenol equal to the total volume of the mixture is added.

Actions and Uses.—The toxicity of the tuberculin is claimed to be materially reduced by the action of the trichophyton while the other properties are not altered. It is claimed that larger doses may be used and that it is more efficient than other forms of tuberculin. The validity of the claims for this preparation has not yet been fully confirmed by clinical observation.

It is used (by hypodermic injection) for diagnostic purposes and for the treatment of pulmonary and other forms of tuberculosis.

Dosage.—The dose and method of administration must be governed by conditions of the case.

Manufactured by Kalle & Co., A. G., Bierbrich a. Rh. (Kalle & Co., New York). U. S. patent No. 939,097 (Nov. 2, 1909; expires 1926). No U. S. trademark.

TUBERCULIN "DENYS" ("B. F."; Bouillon Filtrate; Bouillon Filtré, Denys).

This is the bouillon from cultures on which tubercle bacilli of the human type have grown to maturity (5 to 6 weeks) freed from germs by filtration through porcelain.

H. M. Alexander & Co., Marietta, Pa.

Tuberculin.—**Bouillon Filtrate** "B. F." (Human).—1 and 3 Cc. vials.

Cutter Laboratory, Berkeley, Cal.

Denys' Bouillon Filtrate.—In 1 Cc. vials; preserved with trikresol; for use in dilutions only. Also in serial dilutions.

Tuberculin Bouillon Filtrate.—In 1 Cc. vials; preserved with 4/10 per cent. trikresol. Dosage from 1/100 to 100 mg. or more of the fluid Tuberculin.

Tuberculin B. F. Bovine.—Made in the same manner except that the bovine type of tubercle bacillus is used.

Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a. M., Germany. (Farbwerke Hoechst Co., New York.)

Tuberculin T. O. A. Original Tuberculin T. O. A.—This preparation is a bouillon filtrate. For preparations see Tuberculin "Denys." Supplied in bottles containing 1 Cc. and 5 Cc.

Vacuum Tuberculin.—Tuberculin T. O. A. reduced to 1/10 of its volume in a partial vacuum at a low temperature.

Actions and Uses.—It is intended solely for the treatment of patients who exhibit too violent reactions to Old Tuberculin, to Tuberculin T. R. and to Tuberculin Bacilli Emulsion.

Vacuum Tuberculin is marketed in glass bottles containing 1 Cc. and 5 Cc.

Bovine Tuberculin Old.—A bouillon filtrate from bovine bacilli. Indications similar to those for Tuberculin T. O. A. Supplied in glass bottles containing 1 Cc. and 5 Cc.

Vacuum Bovine Tuberculin.—A tuberculin prepared from bovine bacilli by the process for vacuum tuberculin. The advantage of the vacuum preparations is only in their better keeping qualities. Vacuum bovine tuberculin is supplied in glass bottles containing 1 Cc. and 5 Cc.

H. K. Mulford Co., Philadelphia.

Tuberculin, Bouillon Filtrate, Denys.—Marketed in 1 Cc. vials; also in serial dilutions.

Bacilli Emulsion "B. F."—Marketed in 1 Cc. vials; also in serial dilutions.

Parke, Davis & Co., Detroit, Mich.

Tuberculin B. F.—Marketed in 1 Cc. bulbs; contains 0.4 per cent. trikresol.

"NEW TUBERCULIN."—"T. R."—New Tuberculin represents a portion of the tubercle bacillus.

It is prepared as follows: A suspension of ground, virulent tubercle bacilli is centrifugalized; the upper layer, consisting of extractives and fatty substances mixed with bacilli, is removed while other bacilli and fragments are thrown to the bottom. The sediment is again ground and centrifugalized; the process is repeated until almost no sediment remains. The second and supernatant liquids are united and to them glycerine 20 per cent., and a little formaldehyde in solution are added; this emulsion is the "T. R." Each Cc. represents the residue from approximately 10 mg. dry, originally virulent, tubercle bacilli (human).

H. M. Alexander & Co., Marietta, Pa.

Tuberculin Residue "T. R." (Human) (Koch).

Dixon's Suspension of Dead Tubercle Bacilli.—(See "Possibility of Establishing Tolerance for Tubercle Bacilli," Medical News, Oct. 19, 1889). A suspension of dead tubercle bacilli in physiologic salt solution which have been decreased by prolonged treatment with alcohol and ether. Marketed in syringes containing 0.001 mg. bacilli, which is the standard therapeutic dose.

Cutter Laboratory, Berkeley, Cal.

Tuberculin T. R.—Tubercle Residue.—A suspension of 2 mg. of tubercle substance in each Cc. of the finished product. Dose, from 1/1000 mg. to 100 mg. or more of the fluid T. R.

Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a. M., Germany. (Farbwerke Hoechst Co., New York.)

New Tuberculin "Koch" (T. R.).—Marketed in vials containing 1 Cc. and 5 Cc.

Bovine Tuberculin T. R.—Corresponding to Tuberculin T. R. but prepared from bovine bacilli. In bottles containing 1 Cc.

Tuberculin Residue.—Tuberculin residue is supplied in the form of a moist paste and a dry preparation in vials of 1 Gm. and 5 Gm. each.

H. K. Mulford Co., Philadelphia.

Tuberculin "R."—Marketed both in concentrated form and in serial dilutions.

Parke, Davis & Co., Detroit, Mich.

Tuberculin T. R.—Marketed in 1 Cc. bulbs in 2 strengths; one contains 0.001 mg. of tubercle solids per Cc., the other 1 mg. per Cc.

NEW TUBERCULIN, KOCH, BACILLI EMULSION ("B. E.").—This represents the entire bacilli whether soluble or insoluble.

The germs are simply crushed and pulverized and mixed with equal parts of water and glycerine. The suspension contains 5 mg. dry, originally virulent, tubercle bacilli (human).

H. M. Alexander & Co., Marietta, Pa.

Bacilli Emulsion "B. E." (Human).

Cutter Laboratory, Berkeley, Cal.

Tuberculin Bacilli Emulsion.—Tuberculin B. E.—A suspension of ground tubercle bacilli containing 5 mg. of the solid tubercle substance to each Cc. Dose from 1/1000 mg. to 100 mg. or more of the fluid B. E. Tuberculin.

Tuberculin B. E. Bovine.—Made in the same manner as the foregoing, except that the tubercle bacillus used is of the bovine type.

Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a. M., Germany. (Farbwerke Hoechst Co., New York.)

Koch's Bacilli Emulsion.—Tuberculin marketed in vials containing 1 Cc. and 5 Cc.

Dry Dead Tubercle Germs.—For use in making the bacillary emulsion for the tuberculo-opsonic test.

Bovine Bacilli Emulsion.—Tuberculin corresponding to Koch's Bacilli Emulsion but prepared from bovine bacilli. In original bottles containing 1 Cc. and 5 Cc.

Polygenous Tubercle Bacilli Emulsion.—A bacilli emulsion prepared from eight different cultures of tubercle bacilli which differ as much as possible from each other.

Triturated Tubercle Bacilli.—Used for the preparation of an agglutinating liquid for the detection of agglutinins in the blood serum of tuberculous patients. The bacilli are rubbed in a mortar with 0.8 per cent. sodium chloride solution containing 0.5 per cent. phenol and centrifugized for a short time; the preparation is to be diluted 1 to 10,000 before using. Marketed in bottles containing 0.1 Gm. triturated tubercle bacilli.

Parke, Davis & Co., Detroit, Mich.

Tuberculin B. E. (concentrated).—Bacilli Emulsion, marketed in bulbs containing 1 mg. of dry tubercle solids per Cc.

Moist Dead Tubercle Germs.—For use in making the bacillary emulsion for the tuberculo-opsonic test.

Bacterio-Therapeutic Laboratory, Asheville, N. C.

This laboratory is licensed to manufacture all tuberculin preparations, including Watery Extract of Tubercle Bacilli (von Ruck) and Tubercle Bacilli Emulsions (von Ruck); they are supplied only to physicians who make special applications for them.

TUBERCULOSIS SERUM VACCINE.—An emulsion of human tubercle bacilli, sensitized by the application of tuberculosis serum.

The production of sensitized tubercle bacilli, or bacilli which are capable of complement fixation, is accomplished with the assistance of an efficient tuberculosis-immune serum, which has a considerable content of specific amboceptor antituberculin. The content of this serum in specific amboceptor is ascertained according to the method of complement fixation. Besides antituberculin, this serum contains agglutinating, precipitating and bacteriotropic immune bodies.

Emulsions of sensitized tubercle bacilli are prepared as follows: Human tubercle bacilli, after having been thoroughly washed and briskly dried, are mixed with fresh tuberculosis serum, the quantity of which is calculated from the determination of the immunity bodies. This mixture is left for several days in the incubator, at a temperature of 37° C., and is then shaken in an apparatus, with glass beads, until intact tubercle bacilli are no longer demonstrable in the removed sample. The broken-up masses of bacilli are then separated from the serum, through centrifugalization, washed with physiologic salt solution, and finally worked into fine emulsions, with 40 per cent. glycerine water, to which has been added phenol 0.5 per cent. The contents of this emulsion in bacillary substance amounts to 0.005 Gm. in 1 Cc. The original emulsions and dilutions are to all intents and purposes permanently durable, provided they are kept in a cool place, not exposed to freezing, and protected from the light.

Actions and Uses.—It is claimed that this emulsion contains specific immune bodies which are non-poisonous for healthy and tuberculous subjects, but are capable of exerting a remarkable effect on tuberculous processes.

Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a. M., Germany. (Farbwerke Hoechst Co., New York.)

Tuberculosis Serum Vaccine "Hoechst."—Emulsions of sensitized tubercle bacilli are supplied in the original concentration, in vials of 1 and 5 Cc. each, and also in serial dilutions.

Dosage.—The treatment is begun with 0.1 Cc. of a dilution 1/1,000,000 and the dose gradually increased until 0.5 Cc. of the original emulsions are readily tolerated and the corresponding clinical effects are demonstrable. It should not be used in the presence of cachexia, mixed infection or permanent rise of temperature.

DETRE DIFFERENTIAL TEST.—The Detre Differential Test employs three forms of tuberculin: Old Tuberculin, human Bouillon Filtrate and bovine Filtrate.

H. M. Alexander & Co., Marietta, Pa.

Tuberculin for the Detre Differential Diagnostic Test.—Three capillary tubes: 1. Tuberculin Original, "T. O." 2. Bouillon Filtrate, "B. F." (Human). 3. Bouillon Filtrate, "B. F." (Bovine).

Cutter Laboratory, Berkeley, Cal.

Detre Differential Test.—Made up of one tube each of Tuberculin O. T., Tuberculin B. F. human, Tuberculin B. F. bovine. Each tube contains about 1/10 Cc.

OTHER SERUM PRODUCTS.

ANTIRABIC VACCINE.—An emulsion of the spinal cords of rabbits that have died as a result of the subdural injection of fixed rabies virus. The fixed virus is obtained by passage of rabies virus through a long series of rabbits until the animals die after a uniform period of incubation; this period may vary according to the strain of virus. The cords are removed from the rabbits and, as a rule, dried over potassium hydroxide for a period of from 2 to 15 days.

Use.—Antirabic vaccine is used for the preventive treatment of rabies. Emulsions of the cords are prepared with broth or saline solution and injected subcutaneously. The "scheme of dosage" varies according to circumstances, but the general principle consists in daily

injections, beginning with an emulsion of a cord dried for from 8 to 14 days and gradually increasing until a "2-day" cord is used.

H. M. Alexander & Co., Marietta, Pa.

Antirabic Vaccine.—The fixed virus is of the strain employed by the Hygienic Laboratory, Washington, D. C. An emulsion of vaccine in glycerine sufficient for one dose, together with a syringe and needle, is contained in a vacuum tube by which a low temperature may be maintained for a period of 36 hours. A dose is sent each day by mail; the treatment requires 18 to 22 days.

The American Biologic Company, Kansas City, Mo.

Pasteur Antirabic Vaccine.—The virus is prepared according to the method of the Hygienic Laboratory, Washington, D. C. An amount of the dried cord, sufficient for one dose, is suspended in a mixture of 66½ per cent. glycerine and 33½ per cent. of physiologic salt solution, and sent daily by mail, accompanied by a syringe containing sterile physiologic salt solution for further dilution at the time of administration. The treatment requires 18 to 21 days.

H. K. Mulford Co., Philadelphia.

Rabies Vaccine.—Rabies Vaccine is prepared according to the method of Pasteur and is a complete treatment, consisting of 25 doses, to be administered during 21 days. Each day's injection is shipped in a Caloris vacuum bottle. Complete description and directions accompany each outfit.

ERYSIPELAS AND PRODIGIOSUS TOXINS (Coley).—Parke, Davis & Co., Detroit, Mich. A mixed culture of streptococcus erysipelatis and bacillus prodigiosus made according to the specifications of Dr. W. B. Coley. Marketed in 1 oz. bottles.

Actions and Uses.—Loeb summarizes the results of the treatment of sarcoma with these toxins as follows: "It is therefore likely that the treatment of inoperable sarcoma with the toxins of streptococcus and bacillus prodigiosus leads to a cure in approximately 4 to 9 per cent. of cases. And some results obtained so far suggest that this method of treatment may prove of value as a postoperative procedure in diminishing the number of recurrences, and that in a certain number of cases it might limit the necessity for amputation of the limb in cases of sarcoma of the long bones. As to its mode of action, nothing definite can be stated, but it is likely that the toxins themselves, as well as the local and general reactions they produce, frequently affect the life of the sarcoma cells unfavorably."

The toxins are injected in gradually increasing doses, at first in a part of the body removed from the tumor, and later, if possible, directly into the tumor itself.

NORMAL HORSE SERUM.—Injection of this has been recommended in various conditions in which the coagulative power of the blood is deficient, as in hemophilia, severe anemias and purpura with hemorrhagic tendencies. Applied locally to bleeding surfaces it is said to act as a styptic and to have favorable action on septic wounds. There is, however, an element of danger in the use of this or any other serum in certain conditions (anaphylaxis), and while this is slight because of the rarity of dangerous effects it is sufficient to make the use of serums for purposes in which their value is extremely doubtful a questionable procedure.

National Vaccine and Antitoxin Institute, Washington D. C.

Sterile Normal Horse Serum.—Marketed in syringes containing 10, 15 and 20 Cc.

H. K. Mulford Co., Philadelphia.

Normal Serum (from the Horse).—Marketed in packages of two syringes, each containing 10 Cc. Also in single vials of 100 Cc. each.

SERUM DIAGNOSTIC TESTS.

WIDAL'S TEST FOR TYPHOID.—

Bass Modification.

Bass test for typhoid fever is a modification of the method of Widal.

H. K. Mulford Co., Philadelphia.

Bass Test for Typhoid Fever.—The outfit for testing blood for typhoid fever according to the Bass method consists of the following items: a. Suspension or emulsion of killed typhoid bacilli, each Cc. containing approximately 10 billion killed bacteria.

- b. Glass slide on which to mix the emulsion with suspected blood.
- c. Slide with dried smear of infected blood. This slide is to be afterward used for mixing the emulsion and suspected blood on Slide B.
- d. Needle for pricking ear or finger to obtain suspected blood from the patient.
- e. Pipette for dropping typhoid emulsion and water on slide, previous to mixing with suspected blood.

Borden's Modification.

In this test the serum of the blood is mixed with salt solution and then with a suspension of killed typhoid bacilli, so as to bring the dilution up to 1 to 50. The positive reaction is determined by noting that the clumps of bacteria sink to the bottom of the test tube and leave a limpid, clear fluid above a small, white, flocculent mass of agglutinated bacilli.

H. K. Mulford Co., Philadelphia.

Mulford's Widal Test Outfit (Widal Reaction for Serodiagnosis of Typhoid Fever).—The outfit consists of the following items, all packed in a box containing fixed test-tube rack: (a) 30 Cc. stock bottle of suspension or emulsion of killed typhoid bacilli; (b) 30 Cc. stock bottle of physiologic salt solution, containing 1 per cent. of phenol; (c) 10 Cc. dropping flask for salt solution; (d) 10 Cc. dropping flask for typhoid suspension; (e) 6 graduated test-tubes; (f) 1 graduated pipette; (g) 12 small capillary bulbs or tubes to collect blood-serum, and (h) 1 needle.

WASSERMANN TEST FOR SYPHILIS.—

Noguchi Modification.

The Noguchi test for syphilis is a modification and simplification of the Wassermann test and involves the use of "amboceptor paper," a solution of "antigen" and "complement;" the latter is to be obtained from the blood of a guinea-pig.

Amboceptor.—This is obtained by injecting washed human blood-corpuscles (erythrocytes) into rabbits, at intervals of from five to seven days, over a period of five or six weeks. Ten days are allowed to elapse before the last injection. The rabbits are then bled and the serum collected. Filter paper is now saturated with this serum and allowed to dry. The paper is cut in strips and set aside until wanted for use. In this form amboceptor will keep for a considerable length of time.

Amboceptor paper is standardized by measuring its specific activity. The measurement of specific activity consists in finding the amount of amboceptor necessary to cause hemolysis in 1 Cc. of suspended human red corpuscles, one drop of blood in 4 Cc. normal saline solution with 0.02 Cc. of fresh guinea-pig serum. This is incubated at a tem-

perature of 37 C. for one hour. The quantity of paper necessary to cause hemolysis under these conditions is known as one unit. In the syphilis test two units are used.

Antigen.—This is made by rubbing liver or heart tissue with sand and extracting with absolute alcohol. Macerate 10 grams of tissue in 100 Cc. of alcohol for one week at 37 C., shaking the container every day. Filter until clear. Evaporate the filtrate. Dissolve the resulting extract in ether. Pour this solution into a large quantity of acetone. The acetone precipitates certain lipoid substances which are then collected and redissolved in methyl alcohol, in ratio of 3 per cent. This constitutes the antigen solution. For use mix one part of this with 9 parts, 0.9 per cent. sodium chloride solution. This dilution should not cause hemolysis in an amount of 0.4 Cc., and 0.4 Cc. should not inhibit hemolysis.

H. K. Mulford Co., Philadelphia.

Serodiagnostics of Syphilis (Neguchi System).—The test consists of amboceptor paper and antigen in a package accompanied with full directions for use.

SCARLET R MEDICINAL, Biebrich.—*Rubrum Scarlatinum.*—Scarlet R medicinal, Biebrich, is toluyl-azo- β -naphthol, $\text{OH}_3\cdot\text{C}_6\text{H}_4\cdot\text{N}:\text{NC}_6\text{H}_3\text{N}:\text{N}\cdot\text{C}_{10}\text{H}_5\cdot\text{OH}$.

Biebrich scarlet R medicinal is a dark brownish red powder, nearly insoluble in water, slightly soluble in benzene and acetone and easily soluble in chloroform, oils, fats and phenols. It is slightly soluble in cold alcohol, somewhat more soluble in hot alcohol, while warm petrolatum and paraffin dissolve rather large quantities. When heated to 175° it softens, begins to melt at 181°-188° and at 260° swells up and decomposes. Further heating yields heavy brown, aromatic vapors, which burn, leaving a difficultly but completely combustible residue. The saturated aqueous solution is a clear scarlet red color, which on dilution or in thin layers has a bluish tinge. It is decomposed by nitric acid.

If about 1 Mg. of Biebrich scarlet R medicinal be sprinkled on about 1 Cc. concentrated sulphuric acid it will dissolve in the acid with a bluish-green color, which, on diluting with water, changes consecutively to blue, then to purple and finally to red. After a time a brown flocculent precipitate gradually forms.

If to a small quantity of Biebrich scarlet R medicinal a few Cc. alcohol and 2 drops of concentrated hydrochloric acid be added and the mixture boiled the solution will take on a purple color. This solution on the addition of a few drops of glacial acetic acid becomes scarlet red. If not too small a quantity of the substance was taken it will crystallize out of the acetic acid solution in the form of fine needles.

If about 0.5 Gm. Biebrich scarlet R medicinal be heated to boiling with $\frac{1}{2}$ Cc. acetic acid and then, while boiling, zinc dust be added, the solution will become colorless. A bluish color appears on exposure of this solution to air.

Actions and Uses.—Biebrich scarlet R medicinal is claimed to have a marked power of stimulating the proliferation of epithelial cells.

It is said to be useful to promote the growth of epithelium in the treatment of burns, wounds, chronic ulcers, etc.

Dosage.—This preparation is generally used in the form of an ointment containing from 4 to 8 per cent. of the substance.

The surface to be treated is first thoroughly cleansed with warm water and soap and then dried. The ointment is then applied lightly. In ulcers it is spread very thinly over the surface, from the skin edge inward, unless it be very large, in which case the ointment is applied around the edges only. The application may be left undisturbed for

two or three days, after which time, and for a similar period, some bland ointment can be used.

Non-Proprietary Preparations:

Scarlet R. Medicinal Biebrich, Kalle.—Manufactured by Kalle & Co., Aktiengesellschaft, Biebrich a.Rh., Germany (Heilkraft Medical Co., Boston, Mass.).

Not patented or trademarked. Sold in the form of ointment only. See below.

Scarlet R. Medicinal Biebrich, Merck.—Manufactured by E. Merck, Darmstadt, Germany (Merck & Co., New York).

Not patented or trademarked.

Proprietary Preparations:

Scarlet R. Salve.—Scarlet R. Salve is a mixture containing Biebrich scarlet R medicinal, Kalle & Co., 8 parts, eucalyptol 2 parts and petrolatum 90 parts.

Prepared by the Heilkraft Medical Company, Boston Mass.

SILVER CITRATE.—Silver citrate, $\text{Ag}_3\text{C}_6\text{H}_5\text{O}_7$, is the normal silver salt of citric acid.

Solution of citric acid is neutralized with sodium carbonate and a solution of silver nitrate added with constant stirring. The precipitate is allowed to subside, washed with water, and dried on porous plates. The entire operation must be conducted under protection from the light.

Silver nitrate forms a white, odorless, heavy powder which is moderately sensitive to the light. It dissolves in 3,800 parts of water. On heating to redness a residue of metallic silver remains, weighing 63.16 per cent. of the original salt.

It should be carefully protected from the light.

Actions and Uses.—Silver-citrate is a non-irritating antiseptic.

It is said to be useful in the treatment of wounds, ulcers, gonorrhea and other diseases of the mucous membranes.

Dosage.—It may be applied in substance to wounds. Solutions of from 1 to 4,000 to 1 to 10,000 are recommended for injection into the body cavities, the urethra, etc.

Proprietary Preparations:

ANTISEPTIC-Credé.—A name applied to silver citrate.

Manufactured by Fabrik von Heyden, Radebeul, near Dresden, Germany (Schering & Glatz, New York).

SILVER LACTATE.—Silver lactate, $\text{Ag}_2\text{C}_3\text{H}_5\text{O}_3 + \text{H}_2\text{O}$, is the normal silver salt of lactic acid.

It is prepared by dissolving freshly precipitated silver carbonate in a solution of lactic acid by the aid of heat and concentrating the solution until crystallization begins. The operation must be conducted in a darkened room.

Silver lactate forms colorless crystalline needles, turning brown on exposure to light; it dissolves in 15 parts of water. On heating it leaves a residue of metallic silver weighing 50.2 per cent. It is usually colored somewhat brown and gives with water a brownish or reddish solution. The salt must be protected from the light.

Actions and Uses.—The 1 to 300 to 1 to 500 aqueous solution is said to be equal in disinfecting power to a 1 to 1,000 solution of mercuric chloride. It is irritating if applied in substance to wounds.

It is intended for all purposes for which a powerful antiseptic is desired.

Dosage.—From 1 to 100 to 1 to 2,000 solutions.

SODIUM CACODYLATE.—*Sodii Cacodylas.*—Sodium Dimethylarsenate.—Sodium cacodylate, $(\text{CH}_3)_2\text{AsO.ONa} + 3\text{H}_2\text{O}$, is the sodium salt of cacodylic acid (dimethyl arsenic acid), $(\text{CH}_3)_2\text{AsO.OH}$.

It is prepared by distilling arsenous oxide with potassium acetate, oxidizing the distillate, composed of cacodyl $\text{As}_2(\text{CH}_3)_4$, and cacodyl oxide. $\text{As}_2(\text{CH}_3)_4\text{O}$, with mercuric oxide, neutralizing the cacodylic acid with solution of sodium hydroxide and concentrating to crystallization.

Actions and Uses.—The action of sodium cacodylate is similar to other arsenic compounds, but it is said to be much less toxic than the ordinary preparations of arsenic and is also less apt to cause undesirable side effects. This superiority is due to the slow liberation of the arsenous acid in the body.

The cacodylate has been particularly recommended in obstinate psoriasis, pseudoleukemia, diabetes, anemia, chlorosis, tuberculosis, malarial cachexia, etc.

Dosage.—0.025 to 0.12 Gm. ($\frac{1}{2}$ to 2 grains) in pills, hypodermically or by enema.

PEROGEN BATH.—Oxygen Bath Salts, *Perogen*.—Perogen bath is a preparation consisting of a catalyzer and sodium perborate capable of yielding 10 per cent. of oxygen, the two substances being wrapped separately.

The catalyzer is a light yellow odorless powder, and is made by a method which is the subject of a patent application now pending. The oxygen contents may be determined by any of the well-known methods.

Actions and Uses.—The catalyzer is a medicinally indifferent substance. When the two substances are mixed with water the catalyzer causes the liberation of the available oxygen of the sodium perborate. The oxygen bath thus obtained is said usually to reduce the blood-pressure and pulse rate to a much greater extent than the ordinary bath. It is claimed to have marked tranquilizing and somnifacient effects. It is said to be useful in cardiac affections with high vascular tension and excitement, neuroses, insomnia, chronic nephritis, and skin diseases in which hydrogen dioxide is indicated.

Dosage.—One bath daily until 24 or 48 have been taken, with occasional intermissions.

Manufactured by Morgenstern & Co., New York. U. S. trademark 75,-982. U. S. patent No. 969,073 (Aug. 30, 1910; expires 1927).

SODIUM SUCCINATE, EXSICCATED.—*Sodii Succinas Exsiccatus.*—Exsiccated sodium succinate is the disodium salt of succinic acid containing not less than 95 per cent. anhydrous sodium succinate, $\text{NaOOC.CH}_2\text{CH}_2\text{COONa}$.

Exsiccated sodium succinate occurs as a white, granular, odorless powder, possessing a characteristic saline taste. It is readily soluble in water, but insoluble in alcohol, ether and chloroform.

When heated it chars and burns, leaving a residue which responds to tests for sodium and carbonate.

If 10 Cc. of a 1 per cent. aqueous solution of sodium succinate be treated with 10 Cc. of diluted sulphuric acid no precipitate should form; if this solution be extracted with an equal volume of ether, the ethereal extract on evaporating should leave a white crystalline residue of succinic acid.

If to 10 Cc. of a 1 per cent. aqueous solution of sodium succinate a few drops of ferric chlorid solution be added a voluminous reddish brown precipitate should be formed.

If 10 Cc. of a 1 per cent. aqueous solution of sodium succinate be treated with 1 Cc. of diluted nitric acid, the addition of a few drops of silver nitrate solution should produce not more than a slight opalescence.

If 10 Cc. of a 1 per cent. aqueous solution of sodium succinate be treated with 1 Cc. of diluted hydrochloric acid, the addition of a few drops of barium chlorid solution should produce not more than a faint turbidity within ten minutes.

If 10 Cc. of a 1 per cent. aqueous solution of sodium succinate be acidified with 1 Cc. diluted hydrochloric acid and saturated with hydrogen sulphid no coloration or precipitate should appear.

If about 0.5 Gm. sodium succinate be heated with 5 Cc. of sulphuric acid U. S. P. until dissolved, not more than a darkening but not distinct charring should be observed.

If 0.75 to 1.5 Gm. exsiccated sodium succinate be dried at 150° C. to 200° C., the loss in weight should indicate the presence of not more than 4.0 per cent. moisture; the dried residue treated as described in U. S. Pharmacopœia VIII for sodium acetate should yield an amount of sodium carbonate equivalent to 99 per cent. anhydrous sodium succinate ($\text{NaOOC.CH}_2\text{CH}_2\text{COONa}$). (1 Cc. of half normal sulphuric acid is equivalent to 0.0402 Gm. pure, anhydrous sodium succinate.)

Actions and Uses.—Sodium succinate is a saline cathartic. It has been claimed on not very good evidence that it has an antiseptic action in the biliary tract. It is claimed by some clinicians that sodium succinate is useful in combating infections of the gall-bladder and biliary passages.

Dosage.—From 0.3 Gm. (5 grains) three or four times a day.

Non-Proprietary Preparations:

Sodium Succinate Exsiccated, Fairchild.—Manufactured by Fairchild Bros. & Foster, New York. No U. S. patent or trademark.

Sodium Succinate, Exsiccated, Merck.—Manufactured by Merck & Co., New York. No U. S. patent or trademark.

STOVAINE.—Benzoyl-Ethyl-Dimethylaminopropanol Hydrochloride.—Stovaine is 2-benzoxo-2-methyl-1-dimethyl-amino butane hydrochloride, $\text{CH}_3\text{CH}_2\text{C}(\text{C}_6\text{H}_5\text{COO})(\text{CH}_3)_2\text{CH}_2\text{N}(\text{CH}_3)_2\text{HCl}$. It is closely related to alypin (which see).

It is prepared by causing a reaction of benzoyl chloride on the (a)-dimethyl-amino-pentonal-(b), which is itself the product of reaction of ethylmagnesium chloride on methylaminoacetone.

It crystallizes in small, brilliant scales, which melt at 175° C. (347° F.). It is extremely soluble in water and easily in methyl alcohol and acetic ether, but requires 5 parts of absolute alcohol for solution and is only slightly soluble in acetone. It is quite stable and its solutions may be sterilized at 115° C. (239° F.) without suffering decomposition.

The aqueous solution is slightly acid to litmus, neutral to methyl orange. It is precipitated by all the alkaloidal reagents and is decomposed even by very dilute alkalis.

It is incompatible with alkalis and all alkaloidal reagents.

Actions and Uses.—Stovaine acts as a local anesthetic. It has about the same power as cocaine, but dilates the blood vessels, whereas cocaine contracts them. It is only $\frac{1}{2}$ to $\frac{1}{4}$ as toxic as cocaine. Stovaine also is said to exert a tonic action on the heart.

It is used as a local anesthetic; while most reports are favorable, one case of gangrene has been reported following the use of a 10 per cent. solution.

Dosage.—Internally, 0.002 Gm. (1/30 grain) pill form. Locally it may be used in the eye in 4 per cent. solution and applied to other mucous membranes, as in laryngology, in from 5 to 10 per cent. solution. For hypodermic injections for local anesthesia it can be used in 0.75 to 1 per cent. solution.

Manufactured by the Poulenc Frères Co., Paris, France (Parmele Pharmacal Co., New York). U. S. patents Nos. 829,262, 829,374 (Aug. 21, 1906; expires 1923); 828,846 (Aug. 14, 1906; expires 1923). U. S. trademark No. 59,228.

STYPTICIN.—*Cotarnine Hydrochloridum.*—*Cotarnine Hydrochloride.*—Stypticin is cotarnine hydrochloride, $C_{12}H_{13}O_6N.HCl$, the cotarnine salt of hydrochloric acid. Cotarnine is an oxidation product of narcotine, similar to hydrastine.

It is prepared by boiling narcotine for a long time with water or by heating it with dilute nitric acid and converting the basic product obtained into the hydrochloride.

It is a yellow, crystalline powder, soluble in water and in alcohol. Its melting point is indefinite.

If to a solution of stypticin tenth-normal iodine V. S. is added, a brown precipitate of cotarnine periodide is produced, which if collected and dried over sulphuric acid melts at $140^{\circ} C.$ ($284^{\circ} F.$).

If to a solution of 0.1 Gm. stypticin in 2 Cc. of water 3 drops of a 15 per cent. sodium hydroxide solution are added, each drop will produce a milk-white precipitate which dissolves on agitation. After a time the free base separates from the clear solution, leaving the supernatant liquid clear and but faintly yellow. The base, after recrystallization from benzene, melts with decomposition, at $130^{\circ} C.$ (266° to $269.6^{\circ} F.$).

Actions and Uses.—Stypticin is a hemostatic, analgesic and uterine sedative. The mechanism of its action is obscure.

It is said to be useful particularly in functional dysmenorrhea of puberty and of the climacteric; in subinvolution of the uterus after parturition and abortion, as well as in all profuse uterine hemorrhages; in bleeding from the bladder, from the nose, after extraction of teeth, etc.

Dosage.—Internally 0.05 Gm. ($\frac{3}{4}$ grain) four or five times daily. Because of its intensely bitter taste, it is best given in the form of coated tablets, pills or capsules; or by hypodermic injection (in urgent cases) 2 Cc. of a 10 per cent. solution; externally, as a styptic, pure or in strong solution.

Manufactured by E. Merck, Darmstadt, Germany (Merck & Co., New York).

TANNALBIN.—*Albuminis Tannas.*—*Tannate of Albumin.*—Tannalbin is a compound of tannic acid and albumin thoroughly exsiccated.

It is prepared by precipitating 10 parts of a 10 per cent. solution of egg albumin with 6.5 parts of a 10 per cent. solution of tannic acid, washing the precipitate with water until the washings react only faintly with ferric chloride, drying it on porous tiles, powdering, and heating the product at $126^{\circ} C.$ ($258.8^{\circ} F.$) for six hours.

It is a light brown, odorless and tasteless powder, containing about 50 per cent. of tannic acid. It is practically insoluble in water or alcohol, but slowly soluble in alkaline fluids, which split it up into its constituents.

The filtrate obtained after shaking tannalbin with water should give, at most, a faint reaction with ferric chloride. It is incompatible with alkaline liquids.

Actions and Uses.—Tannalbin is astringent. Being insoluble in the gastric juice, it becomes effective when it reaches the intestines, where it slowly splits off tannic acid. It does not produce gastric disturbance.

It is said to be useful in diarrhea, especially in that of children, and in phthisis.

Dosage.—From 1 to 4 Gm. (15 to 60 grains) in powder (or tablets) followed by water; infant doses from 0.3 to 0.5 Gm. (5 to 8 grains) in gruel or other mucilaginous liquid.

Manufactured by Knoll & Co., Ludwigshafen a. R., Germany, and New York. U. S. patent No. 563,479 (July 7, 1896; expires 1913). U. S. trademark No. 28,348.

TANNIGEN.—*Acidum Tannicum Diacetylum.*—*Diacetyl-Tannin.*—Tannigen is tannyl acetate, $(\text{CH}_3\text{CO})_2\text{C}_{14}\text{H}_8\text{O}_9$, the acetic acid ester of tannin.

It is prepared by heating tannin and acetic anhydride, in molecular proportions, in the presence of glacial acetic acid in a flask under a reflux condenser, pouring the product of the reaction into water, washing the precipitate produced with warm water, drying and powdering.

It is a light-gray, almost odorless and tasteless powder, which undergoes no change when heated alone, even to 180°C . (356°F .), but softens when heated in water at 50°C . (122°F .). It is practically insoluble in cold water, scarcely soluble in hot water, but soluble in alcohol, and also in solutions of borax, sodium phosphate, sodium carbonate, lime, etc., being reprecipitated from these solutions by acids. It is rapidly saponified by boiling sodium or potassium hydroxide solutions, or gradually in the cold, into acetic and gallic acids, while ammonia produces acetic and tannic acids.

Its aqueous solutions produce with ferric salts a green color, instead of the blue-violet color characteristic of tannic acid. A slightly alkaline solution in sodium phosphate exhibits all the characteristics of an astringent and precipitate albumin, but these properties are destroyed by borax or more alkali.

It is incompatible with alkalis and with salts of iron; it should not be exposed to heat or moisture.

Actions and Uses.—Tannigen passes unchanged into the intestine, where it becomes effective as an astringent in contact with the alkaline juice. It is said to be free from irritant action. (See note under Creosote Carbonate).

It is said to be useful in acute diarrheal affections, such as acute intestinal catarrhs, cholera morbus, cholera infantum and dysentery; it has also been used with reported success for the diarrhea of typhoid fever and intestinal tuberculosis.

Dosage.—From 0.2 to 0.7 Gm. (3 to 10 grains four times per day, dry on the tongue followed by a swallow of water; or mixed with food, avoiding warm or alkaline liquids.

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Farbenfabriken of Elberfeld Co., New York). U. S. patent No. 533,718 (Feb. 5, 1895; expired 1912). U. S. trademark No. 117,668.

TANNOFORM.—*Tanninformaldehydum.*—*Tanninformaldehyde*—*Methyleneditannin*—*Tannoform*, $\text{CH}_2(\text{C}_6\text{H}_3\text{O}_6)_2$, is a condensation product of formaldehyde with gallotannic acid.

It is prepared by mixing solutions of formaldehyde and tannic acid, precipitating with concentrated hydrochloric acid, washing the precipitate with water, and drying.

It forms a voluminous, reddish powder, odorless and tasteless. It is insoluble in water, but soluble in alkaline liquids and in alcohol. 0.01 Gm. of tannoform dissolved in 2 Cc. concentrated sulphuric acid forms a brown solution which on warming becomes green and later changes to blue. The green or blue solution, on addition of alcohol, assumes a brilliant blue color, which gradually changes to wine color, while on addition of dilute sodium hydroxide the color is pale green.

Its incompatibilities are those of tannin generally.

Actions and Uses.—*Tannoform* is astringent and antiseptic. It is said to be useful on account of these properties in chronic intestinal catarrh and externally in hyperidrosis, bromidrosis, weeping eczema, ozena, etc.

Dosage.—From 0.25 to 0.5 Gm. (4 to 8 grains); externally pure or in from 25 to 50 per cent. triturations (with talc) as dusting powder, or as 10 per cent. ointment or soap.

Manufactured by E. Merck, Darmstadt, Germany (Merck & Co., New York). German patents Nos. 88,082 and 88,841.

TANNOPIN.—*Hexamethylene-Tetramine-Tannin.*—*Tannon.*—*Tannopin*, $(\text{C}_6\text{H}_{10}\text{O}_6)_3(\text{CH}_2)_6\text{N}_4$, is a condensation product of tannin with hexamethylenamine.

It is prepared by mixing molecular proportions of solutions of hexamethylenamine and tannic acid, collecting, washing and drying the precipitate.

It is a fine, fawn-colored, odorless and tasteless, non-hygroscopic powder, containing 87 per cent. of tannin and 13 per cent. of hexamethylenamine. It is insoluble in water, weak acids, alcohol, chloroform or ether, but slowly soluble in dilute alkalis. On heating dry tannopin, it swells and gives off the odor of formaldehyde. The odor of formaldehyde is also developed on heating tannopin with dilute sulphuric or hydrochloric acid, while on boiling with sodium hydroxide solution it splits off ammonia. The clear aqueous filtrate from tannopin does not give a reaction with ferric chloride.

It is incompatible with alkalis.

Actions and Uses.—*Tannopin* has an astringent and antiseptic action in the intestine; it passes unchanged through the stomach, but, being gradually decomposed by alkalis, it becomes effective in the intestinal tract, exerting the action of its two components.

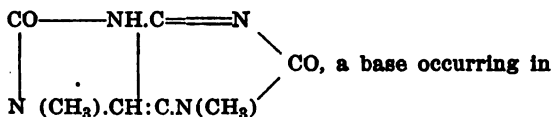
It is said to be useful in acute, subacute or chronic intestinal catarrh, in tuberculous enteritis, and other intestinal disorders.

Dosage.—From 0.3 to 0.5 Gm. (5 to 8 grains) for infants and children; 1 Gm. (15 grains) for adults, dry on the tongue, followed by a swallow of water, or sprinkled on food, four times a day.

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Farbenfabriken of Elberfeld Co., New York). U. S. patent No. 607,172 (July 12, 1898; expires 1915). U. S. trademark No. 31,527.

THEOBROMINE AND THEOBROMINE COMPOUNDS.

THEOBROMINE.—Theobromina.—3,7-Dimethyl-Xanthine.—Theobromine is 3,7-dimethyl xanthine,



Theobroma cacao, Kola acuminata, etc., and also made synthetically. Theobromine is closely related to caffeine (1, 3, 7 trimethyl xanthine).

It is a white crystalline powder, odorless and bitterish. It is almost insoluble in cold water or chloroform, readily soluble in hot alcohol and in ether. It forms salts with acids.

Actions and Uses.—The uses of theobromine are similar to those of caffeine, but its action is said to be relatively greater on the heart and muscles and also as a diuretic. It does not act so powerfully on the central nervous system.

It is used as a diuretic. The great obstacle to its use has been its insolubility and the consequent uncertainty of the degree of its absorption. It is liable to produce gastric disturbances.

Dosage.—From 0.35 to 0.5 Gm. (5 to 8 grains).

AGURIN.—Theobrominae Sodio-Acetas.—Theobromine-Sodium-Acetate.—Agurin, $\text{NaC}_7\text{H}_7\text{N}_4\text{O}_2 + \text{NaC}_2\text{H}_3\text{O}_2$, is a double salt of sodium acetate and theobromine-sodium.

It is prepared by adding to a solution of one molecule of sodium hydroxide one molecule of theobromine. To this solution of sodium theobromine one molecule of sodium acetate is added and the solution brought to dryness.

It is a white, finely crystalline powder, containing 60 per cent. of theobromine. It is freely soluble in water, not very readily soluble in cold, more so in hot alcohol. It is quite hygroscopic, and in watery solutions gradually splits up into its components, and more readily in the presence of carbon dioxide.

It is precipitated and decomposed by carbon dioxide and by acids; it forms a bluish-white precipitate with silver nitrate, a blue precipitate with copper sulphate, white with tartar emetic, red-brown with ferric salts. It is not readily precipitated by Mayer's reagents, nor by iodine.

It is incompatible with carbonate beverages, acids, saccharine and mucilaginous liquids, and most of the alkaloid reagents.

Actions and Uses.—Agurin acts like theobromine, over which it has the advantages of great solubility and of being well tolerated by the stomach. While inferior in diuretic power to theophyllin (which see), it is said to have greater power in sustaining the diuresis produced.

Dosage.—From 0.5 to 1 Gm. (7 to 15 grains), preferably in wafers or capsules. If in solution, this should be freshly prepared (with peppermint water) and without sugar or mucilage.

Manufactured by Farbenfabriken, vorm. Frieder. Bayer & Co., Elberfeld, Germany (Farbenfabriken of Elberfeld Co., New York). U. S. trademark.

Tablets, Agurin, 5 grains.—Each tablet contains agurin 0.33 Gm. (5 grains).

THEOBROMINE SODIUM SALICYLATE.—Theobrominae Sodio-Salicylas.—Theobromine sodium salicylate, $\text{NaC}_7\text{H}_7\text{N}_4\text{O}_2 + \text{NaC}_7\text{H}_5\text{O}_2$, is a double salt of theobromine-sodium and sodium salicylate. It is

official in the German Pharmacopoeia as theobrominum natrio-salicylicum.

It is prepared by adding to a solution of one molecule of sodium hydroxide one molecule of theobromine. To this solution of sodium theobromine one molecule of sodium salicylate is added and the solution brought to dryness.

It is a white powder, odorless, having a saline taste, and containing 50 per cent. of theobromine. It is freely soluble in water, and, like "theobromine sodium-acetate" (see agurin) is readily decomposed by exposure to carbon dioxide or by the action of acids. It must therefore be preserved in well-stoppered bottles.

The aqueous solution (1 to 5) is colorless, turns litmus paper blue and after acidification with acetic acid assumes a violet coloration on addition of ferric chloride solution. From the solution, hydrochloric acid precipitates salicylic acid, and, after a time, also theobromine, the precipitate being completely soluble in sodium hydroxide solution, but not in ammonia water. If 10 Cc. of the solution, rendered clear by the addition of sodium hydroxide solution, is shaken with 10 Cc. of chloroform, the chloroform when separated and evaporated should leave a residue not exceeding 0.005 Gm. for 1 Gm. theobromine sodium salicylate.

It is incompatible with acids, bicarbonates, borates, phosphates, ferric salts, hydrated chloral, etc.

Actions and Uses.—The effects of theobromine sodium salicylate are the same as those of theobromine (which see), over which it has the advantage of greater solubility.

Dosage.—1 Gm. (15 grains) five or six times a day. The tendency to produce gastric irritation may be prevented by giving the drug in well-diluted solution, or, if preferred, in capsules or wafers, followed by water.

THEPHORIN.—Theobrominae Sodio-Formae.—Theobromine Sodium Formate. Thephorin is theobromine sodio-formate, $\text{NaC}_7\text{H}_7\text{N}_4\text{O}_2 + \text{NaCHO}_2 + \text{H}_2\text{O}$, a double salt of sodium formate and theobromine sodium.

It is prepared by dissolving 70.1 parts of theobromine sodium in 200 parts of water and adding to it a solution of 23.5 parts of anhydrous sodium formate in 50 parts of water, filtering the mixture, and evaporating to dryness on a steam bath or in vacuo. Thephorin is a white, odorless powder having a saline bitter taste and is readily soluble in water producing an alkaline solution. From its aqueous solution the theobromine is precipitated by acetic acid. In the filtrate formic acid is indicated by the reduction of silver nitrate.

If an aqueous solution of thephorin be faintly acidulated with nitric acid, the filtrate should give no precipitate with barium chloride, nor with silver nitrate, nor with ammonia water and hydrogen sulphide.

Two Gm. thephorin are placed in a porcelain dish and dissolved in 10 Cc. water with the aid of gentle heat. A few drops of phenolphthalein test solution are placed in the solution, neutralized with nitric acid, the faint alkaline reaction is again restored by means of diluted ammonia, the solution is then thoroughly stirred and, with frequent stirring, allowed to stand for three hours at ordinary temperature.

The resulting precipitate collected on a weighed filter of 8 Cm. diameter is dried at a temperature of 100 C.; it is then washed twice with cold water, using 10 Cc. each time. The filter is again dried at a temperature of 100 C. and weighed. The weight of the precipitate should amount to 1.2 Gm.

Actions and Uses.—Thephorin is said not to irritate the stomach and acts as a powerful diuretic, both on account of the theobromine which it contains and also from the action of sodium formate.

It is said to be useful in cardiac affections, nephritis, dropsy, etc.

Dosage.—0.5 Gm. ($7\frac{1}{2}$ grains) two or three times a day in the form of powder or as tablets.

Manufactured by F. Hoffman-LaRoche & Co., Basel, Switzerland (The Hoffman-LaRoche Chemical Works, New York). U. S. patent No. 799,764 (Sept. 19, 1906; expires 1922). U. S. trademark No. 69,581.

Thephorin Tablets, 7½ grains.—Each tablet contains thephorin 0.5 Gm. (7½ grains).

UROPHERIN-B.—**Theobrominæ et Lithii Benzoas.**—Theobromine and Lithium Benzoate—Uropherin Benzoate.—Uropherin-B is theobromine lithio-benzoate, $\text{LiC}_7\text{H}_7\text{N}_4\text{O}_2 + \text{LiC}_7\text{H}_5\text{O}_2$, a double salt of theobromine-lithium and lithium-benzoate.

It is a white powder containing 50 per cent. of theobromine. It is soluble in 5 parts of water; it decomposes on exposure to light and air.

A solution of uropherin-B will respond to the various tests for lithium, theobromine and benzoate.

Actions and Uses.—Uropherin-B is a diuretic, said to be particularly efficient in connection with digitalis.

It is said to be useful in dropsy, nephritis and diseases of the heart and of the genito-urinary organs.

Dosage.—From 0.3 to 1 Gm. (5 to 15 grains) in powder or capsules, followed by water.

Manufactured by E. Merck, Darmstadt (Merck & Co., New York). U. S. trademark.

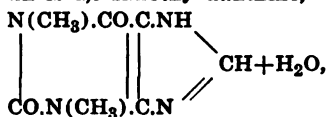
UROPHERIN-S.—**Theobrominæ et Lithii Salicylas.**—Theobromine and Lithium Salicylate—Uropherin Salicylate.—Uropherin-S is theobromine lithio-salicylate, $\text{LiC}_7\text{H}_7\text{N}_4\text{O}_2 + \text{LiC}_7\text{H}_5\text{O}_3$, a double salt of theobromine-lithium and lithium salicylate.

Actions and Uses.—The properties, actions, uses and dosage of this compound are practically the same as those of "theobromine-lithium benzoate." (See Uropherin-B.)

Manufactured by E. Merck, Darmstadt, Germany (Merck & Co., New York). U. S. trademark.

THEOPHYLLINE AND THEOPHYLLINE COMPOUNDS.

THEOPHYLLIN.—**Theophyllina.**—1,3-Dimethyl-Xanthine.—Theophyllin is 1,3-dimethyl-xanthine,



an organic base isomeric with theobromine; it is found in small amounts in tea and is also made synthetically.

It is a white odorless, crystalline powder, having a bitter taste, and melting at 268° C. (514.4° F.). It is soluble in 180 parts of water at ordinary temperature and in 85 parts at 27° C. (80.6° F.), sparingly soluble in alcohol, insoluble in ether. It forms easily soluble compounds with ammonium and potassium, a less soluble salt with sodium, but a freely soluble double salt with sodium acetate.

It responds to the murexid test. Addition of tannin to a solution of theophyllin produces a precipitate soluble in an excess of the reagent. It is soluble in an excess of sodium hydroxide solution (difference from caffeine). On addition to solution of theophyllin in sodium hydroxide of a solution of sulphanilic acid 0.5, hydrochloric acid 5.0, water 100, to which a few drops of a 0.5 per cent. solution

of sodium nitrite have been added (diazo test), a red coloration is produced (distinction from caffeine and theobromine).

Actions and Uses.—Theophyllin has a diuretic action similar to that of caffeine or theobromine but is more powerful. The diuretic effect, however, is probably not so lasting and its administration is, therefore, advantageously followed by one of the theobromine derivatives having a weaker, but more persistent, action. It may produce gastric disturbances and renal irritation has also been reported.

It is used in cardiac affections, nephritis, dropsy, etc.

Dosage.—From 0.2 to 0.35 Gm. (3 to 5 grains) in warm tea.

Proprietary Preparations:

THEOPHYLLIN-Boehringer, Theophyllin.—Boehringer is a name applied to theophyllin prepared by transformation of uric acid.

Manufactured by C. F. Boehringer & Soehne, Mannheim, Germany (Merck & Co., New York). U. S. patent Nos. 667,381 (Feb. 5, 1910; expires 1918); 757,323, 757,329 (April 12, 1904; expires 1921).

THEOCIN.—Theocin is a name applied to theophyllin prepared by treating the monoformyl derivative of 1,3-dimethyl-4,5-diamido-2,6-dioxypyrimidin with alkalis and subsequently with acids.

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Farbenfabriken of Elberfeld Co., New York). U. S. patent No. 716,994 (Dec. 30, 1902; expires 1919). U. S. trademark No. 39,135.

THEOPHYLLIN SODIO-ACETATE.—Theophyllinæ sodio-acetata.—Theophyllin sodium-acetate, $C_7H_7N_4O_3Na + CH_3COONa + H_2O$, is a double salt of sodium acetate and 1,3-dimethylxanthine-sodium (theophyllinsodium).

It is a white crystalline powder, containing about 60 per cent. of anhydrous theocin. It dissolves in about 20 parts of water at 25° C. (77° F.), but is insoluble in alcohol or ether.

Actions and Uses.—This drug has the diuretic properties of theophyllin and being more soluble it is claimed to be more readily absorbed and to be better tolerated than theophyllin.

It is said to be useful in cardiac affections, nephritis, dropsy, etc.

Dosage.—From 0.2 to 0.35 Gm. (3 to 5 grains) best given after meals.

Proprietary Preparations:

ACET-THEOCIN SODIUM.—A name applied to theophyllin-sodio acetate.

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Farbenfabriken of Elberfeld Co., New York). U. S. patent No. 716,994 (Dec. 30, 1902; expires 1919). U. S. trademark No. 39,135.

Acet-Theophyllin Sodium.—A name applied to theophyllin-sodio acetate.

Manufactured by C. F. Boehringer & Soehne, Mannheim, Germany (Merck & Co., New York). U. S. patents Nos. 667,381 (Feb. 5, 1901; expires 1918); 757,323, 757,329 (April 12, 1904; expires 1921).

THERMODIN-Phenacetin-Urethane.—Acetylparethoxy. — Phenyl-Urethane.—Thermodin, $C_6H_4(OC_2H_5).(N(COOC_2H_5)CH_3CO)$ is a compound of acetphenetidin (phenacetin) and ethyl carbamate (urethane). It is chemically related to acetphenetidin (phenacetin), but differs from

the latter in that it contains the group $(N(COOC_2H_5)(CH_3CO))$ in place of $(NH.CO.CH_3)$.

It is prepared by the action of ethyl chlorocarbonate on para-phenetidin, by which paraethoxyphenyl-urethane is formed, which is converted into the acetyl compound by heating with acetic anhydride.

It forms colorless, odorless and tasteless crystals, melting at 86° to 88° C. (186.8° to 190.4° F.). It is practically insoluble in cold water (1:2600); soluble in 450 parts of boiling water.

If 0.5 Gm. of thermodin, 5 Cc. sulphuric acid and 5 Cc. of alcohol are mixed and warmed gently, the odor of ethyl acetate is developed. A solution of 0.5 Gm. of thermodin in 5 Cc. of sulphuric acid on the addition of 0.2 Gm. of sucrose assumes a red color, becoming more intense on standing (distinction from neurodin). If 0.5 Gm. of thermodin be boiled with 3 Cc. of hydrochloric acid during one minute, then mixed with 5 Cc. phenol solution 1:20, and a solution of chlorinated lime added, an onion red color appears which changes to blue on supersaturation with ammonium hydroxide. 0.1 Gm. of thermodin dissolved in 1 Cc. of sulphuric acid should form an almost colorless solution. 0.1 Gm. of thermodin on ignition should not leave a weighable residue.

Actions and Uses.—Thermodin is an analgesic, antipyretic and antiseptic.

It is said to be useful as a mild and reliable antipyretic in typhoid fever, pneumonia, influenza, tuberculosis and febrile conditions in general, and is said to be free from unpleasant by-effects. There is every reason to believe, however, that for use in these infectious diseases it is open to the same objection as the other derivatives of acetphenetidin and related products. (See Acetphenetidin.)

Dosage.—From 0.3 to 0.6 Gm. (5 to 10 grains) as an antipyretic; from 1 to 1.3 Gm. (15 to 20 grains) as an analgesic.

Manufactured by E. Merck, Darmstadt, Germany (Merck & Co., New York). U. S. trademark.

THIGENOL.—Solution of Sodium Sulpho-Oleate, Roche.—Thigenol is a solution of the sodium salts of synthetic sulpho-oleic acids, containing 2.85 per cent. sulphur.

Precipitated sulphur is dissolved by boiling in the glyceride of oleic acid; the resulting solution is treated with sulphuric acid, during which process sulphurous acid escapes, and a sulpho-oleic acid is separated out. The separated sulpho-acid is then obtained by pouring into water, and subsequently washing thoroughly. By treatment with solution of sodium hydroxide, there results a solution of sodium sulpho-oleate, which is evaporated in vacuo until it has a specific gravity of 1.05 to 1.06.

Thigenol is a dark brown liquid, having a faint sulphurous odor. It is soluble in one or more parts of water, dilute alcohol, glycerine, chloroform, oily or fatty bases, with any one of which it mixes freely. When water is the vehicle employed, it should be distilled; hard water will cause a precipitate. Thigenol is incompatible with mineral acids or acetic acid.

Actions and Uses.—Thigenol is said to have the actions of sulphur. It is claimed to stimulate granulation, restrict secretions and to be antipruritic.

It is used in diseases of the uterus and its appendages and in skin diseases in which sulphur is commonly employed.

Dosage.—From 0.2 to 0.6 Gm. (3 to 10 grains) in plain or sweetened water. Thigenol is used locally either in the pure state or mixed in any desired proportion with ointment bases, fats or glycerine according to the intensity of action required.

Manufactured by F. Hoffman-LaRoche & Co., Basel, Switzerland (The Hoffman-LaRoche Chemical Works, New York). U. S. trademark No. 51,393. Not patented.

THIOL.—**Thiolium.**—Thiol is a water-soluble mixture of sulphurated and sulphonated petroleum oils.

Thiol is prepared by heating certain paraffin oils with 10 per cent. of sulphur, by which a partial addition of the sulphur takes place. The thiol oil thus formed is then treated with sulphuric acid for sulphonization. The excess of sulphuric acid is washed out by water and the sulphonated product neutralized by ammonia and the solution freed by dialysis from all inorganic salts. The dialyzed product evaporated to dryness contains about 12 per cent. of sulphur. For therapeutic purposes the evaporation is not carried to absolute dryness, but the product is marketed either in the form of a syrupy liquid (Thiol Liquid, see below) or as a powder (Thiol Dry, see below).

Thiol is a brown powder with a pleasant odor resembling Russia leather, having a somewhat bitter and slightly astringent taste. It swells up in water and finally dissolves. It is also soluble in alcohol and slightly soluble in ether.

Thiol should not markedly redden litmus paper.

Actions and Uses.—Thiol is said to have a drying, astringent, antiphlogistic, and disinfecting action. Taken internally it is said to favor digestion and defecation. It is said to be useful in skin diseases, especially in dermatitis, acne, eczema, erysipelas, erythema, furunculosis, herpes, pruritus, pityriasis, etc. It is also claimed to be useful in burns, in rheumatism and in certain diseases of women.

Dosage.—Thiol may be applied locally in the form of liquid thiol in full strength or in solution with glycerine or water or in the form of ointment or a 2 per cent. solution of liquid thiol may be used as a spray. Internally it may be given in the form of dry thiol in the dose of 0.1 to 0.2 Gm. (1½ to 3 grains) three times a day. Dry thiol may be employed as a dusting powder, either alone or with 80 per cent. of starch or in the form of ointment or of paste.

Manufactured by J. D. Riedel, Aktiengesellschaft, Berlin, Germany (Riedel & Co., New York). U. S. trademark No. 16,553.

Thiol Dry.—**Thiolium Siccum.**—Thiol dry is a brown powder with properties corresponding to the description of thiol, containing from 8 to 9 per cent. of sulphur.

Actions, Usage and Dosage.—See Thiol.

Thiol Liquid.—**Thiolium Liquidum.**—Thiol liquid is a preparation of thiol containing about 1.8 to 2 per cent. of sulphur.

It is a dark brown neutral liquid of a not unpleasant smell resembling that of Russian leather. It is easily soluble in water and glycerine, but only slightly soluble in ether.

Actions, Uses and Dosage.—See Thiol.

THIOSINAMINE AND THIOSINAMINE COMPOUNDS.

THIOSINAMINE.—**Thiosinamina.**—Allyl Sulphocarbamide—Allyl Thiourea—Rhodamine.—Thiosinamine is allyl-thio-urea, $(\text{NH}_2)\text{CS}.\text{NHCH}_2\text{CH}:\text{CH}_2$.

It is prepared by warming together volatile oil of mustard (chiefly allyl thiocyanate) and alcoholic solution of ammonia, collecting the crystalline product of condensation, and recrystallizing from alcohol.

It forms colorless crystals, having a slight alliacious odor and bitter taste and melting at 74°C . (165.2°F). It is moderately soluble in water, but is decomposed by this solvent. It is soluble in about 3 parts of alcohol and readily soluble in ether.

It is incompatible with water, which decomposes it, but this change is to a limited extent prevented by the presence of glycerine.

Actions and Uses.—Thiosinamine appears to cause or quicken the absorption of exudates, lymphatic swellings, scar tissue, etc., the action being unexplained. The opinions as to its value are contradictory.

It is used by hypodermic injection in lupus, chronic glandular tumors, cicatrices, etc., and by the mouth in stricture, corneal opacity and chronic deafness.

Dosage.—From 0.03 to 0.1 Gm. ($\frac{1}{4}$ to $1\frac{1}{4}$ grains) in capsules or tablet triturates; in subcutaneous injections, from 0.05 to 0.2 Gm. (1 to 5 grains) in 15 per cent. alcoholic or 10 per cent. glycerinated water solution.

FIBROLYSIN.—Solution Thiosinamine Sodium Salicylate.—Liquor Thiosinaminæ Sodio-Salicylatis.—A sterilized solution containing 15 per cent. of a double salt of thiosinamine and sodium salicylate, $(\text{NH}_2.\text{CS}.\text{NHCH}_2.\text{CH}:\text{CH}_2) \text{C}_6\text{H}_4(\text{OH})(\text{COONa})$.

It is prepared by mixing the two compounds in solution.

It is an aqueous odorless solution. It does not keep well in the air, but is marketed in sealed, brown glass vials, each containing 2.3 Cc. (37 minims) of the solution, equivalent to 0.2 Gm. (3 grains) of thiosinamine.

The tests are those of thiosinamine and sodium salicylate.

Actions and Uses.—This drug has the same uses as thiosinamine, with the advantage of quicker absorption and freedom from pain or irritation, on account of its solubility and aqueous vehicle.

Dosage.—The contents of one vial (2.3 Cc. = 0.2 Gm. thiosinamin) by subcutaneous, intramuscular or intravenous injection; one injection being administered daily or every second or third day.

Manufactured by E. Merck, Darmstadt, Germany (Merck & Co., New York). U. S. trademark No. 49,160.

THYROID PREPARATIONS.

IODOTHYRINE.—Thyrolodine.—Iodothyryne is a milk sugar trituration of the active principle of thyroid gland, 1 Gm. representing 1 Gm. of fresh gland and containing 0.0003 Gm. of iodine.

According to the patent specifications iodothyryne may be obtained by boiling the fresh thyroid glands, freed from fat, with dilute sulphuric acid, cooling the liquid and collecting the body which separates, dissolving the active portion in alcohol and evaporating to dryness. The product is further purified by washing with ether, which dissolves impurities. One part of the active ingredient is mixed with 309 parts of sugar of milk.

It is a white or yellowish white powder, having the sweet taste of milk sugar.

Actions and Uses.—It is claimed to correspond to glandulæ thyroideæ Siccæ, U. S. P.; but the results have not been uniform, indicating a variable activity.

Dosage.—Adults, from 0.6 to 2 Gm. (10 to 30 grains); children, from 0.3 to 1 Gm. (5 to 15 grains) per day.

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Farbenfabriken of Elberfeld Co., New York). E. Merck, Darmstadt (Merck & Co., New York). U. S. patent No. 626,648 (June 6, 1899; expires 1916). U. S. trademark No. 29,406.

Iodothyryne Tablets, 5 grains.—Each tablet contains iodothyryne 0.33 Gm. (5 grains).

TRIOXYMETHYLENE — Paraformaldehydum. — Paraformaldehyde. Trioxymethylene, $(\text{CH}_2\text{O})_x$, is a polymeric condensation of formaldehyde.

It is prepared by concentrating an aqueous solution (40 per cent.) of formaldehyde by evaporation.

It is a white, crystalline powder, melting at 171° C. (339.3° F.). It is insoluble in alcohol or ether, but slowly soluble in water at ordinary temperature, more rapidly when heated, formaldehyde being regenerated as indicated by the vapors given off.

It responds to the tests for formaldehyde.

It has the same incompatibilities as formaldehyde: Bases, oxidizing agents, gelatin, tannin, etc.

Actions and Uses.—Antiseptic and escharotic. Externally it is used chiefly to generate formaldehyde by heating, for disinfection or for inhalations.

Dosage.—Internally, from 0.3 to 1 Gm. (5 to 15 grains); externally (for warts), in 10 per cent. suspension in collodion.

Manufactured by E. Merck, Darmstadt, Germany (Merck & Co., New York). It is not patented or trademarked.

TROPACOCAINE HYDROCHLORIDE.—Tropacocainæ Hydrochloridum.—Benzoylpseudotropine Hydrochloride—Tropine.—Tropacocaine hydrochloride, $C_8H_{14}NO(C_7H_5O)HCl$, is the hydrochloride of synthetic tropacocaine.

Pseudotropin-Lieberman is obtained from tropinon or from tropin by electrolytic reduction and from this the benzoyl derivative is obtained and this is converted to the hydrochloride.

It forms colorless, needle-shaped crystals, melting at 271° C. (519.8° F.). It is readily soluble in water, and its solution keeps well for several months. Heated in the presence of hydrochloric acid it is split into benzoic acid and tropine.

Its incompatibilities are the same as those of the alkaloids in general.

Actions and Uses.—Tropacocaine hydrochloride is a local anæsthetic, resembling cocaine very closely in its general action, but only half as poisonous. It is reported that anæsthesia sets in more rapidly and lasts longer than with cocaine. It produces less dilatation of the pupils, sometimes none at all. It is employed as a local anæsthetic.

Dosage.—It is applied in from 3 to 10 per cent. aqueous solutions containing 0.6 per cent. sodium chloride.

Manufactured by E. Merck, Darmstadt, Germany (Merck & Co., New York). U. S. patent No. 628,293 (July 4, 1899; expires 1916).

TYRAMINE.—Tyramine is para-hydroxy-phenyl-ethyl-amine hydrochloride $OH.C_6H_4.CH_2.CH_2.NH_2.HCl$, the hydrochloride of the base para-hydroxy-phenyl-ethyl-amine $OH.C_6H_4.CH_2.CH_2.NH_2$ obtained synthetically.

The base para-hydroxy-phenyl-ethyl-amine was first isolated by Barger from ergot and also prepared synthetically by him by the reduction of para-hydroxy-acetonitrile with sodium in alcoholic solution, (Transactions of the Chemical Society, Vol. 95, 1909). It is chemically and physiologically related to epinephrine $(C_8H_9(OH)_2(CHOH.CH_2.NHCH_3))$.

Tyramine occurs as an almost white crystalline powder, easily soluble in water, forming a neutral solution.

Actions and Uses.—Taken internally or injected subcutaneously tyramine increases the blood pressure; for this reason it can be used in shock or collapse; it is also claimed to be valuable for producing post-partum contraction of the uterus. It is useless as a local hemostatic.

The action is similar to epinephrine, being weaker and slower, but lasting longer.

Dosage.—It is best used subcutaneously, in doses of from 0.02 Gm. ($\frac{1}{8}$ grain) dissolved in water.

Manufactured by Burroughs, Wellcome & Co., London, England, and New York. British patents Nos. 1560 and 1561 (Jan. 22, 1909). British trademark No. 809,260. No U. S. patent. U. S. trademark applied for. **Tablet Tyramine Hypodermic.**—Each tablet contains tyramine 0.02 Gm. ($\frac{1}{8}$ grain).

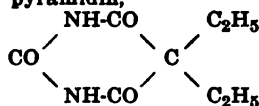
UREA.—Urea, $\text{CO}(\text{NH}_2)_2$, is the diamide of carbonic acid.

Urea occurs as colorless transparent prismatic crystals almost odorless having a cooling saline taste. It is somewhat hygroscopic. It is soluble in water (1-1), more readily in hot water. Soluble in alcohol (1-7) and (1-1) in boiling alcohol. It is insoluble in ether and chloroform. It fuses at 132°C . (269.6°F), evolving ammonia and ammonium cyanate. Kept at 150°C . (302°F) for some time most of it is converted to biuret. If the temperature is raised to 170°C . (338°F) the biuret evolves ammonia and is converted to cyanuric acid. Heated with water under pressure it is decomposed into ammonium carbonate. It is not alkaline, but is a weak base and though a diamide, forms salts like a monacid base; these are acid to litmus. By hydrolysis it is converted into ammonia and carbon dioxide. Nitric and oxalic acids produce precipitates when added to concentrated solutions of urea.

Actions and Uses.—Urea is an active diuretic; it is rapidly eliminated and is not poisonous. It has been claimed, without convincing proof, to have the power of dissolving urinary calculi. It has been recommended in the treatment of tuberculosis, but this use of it is generally being abandoned. It may be employed where diuresis is indicated, though it appears irrational in primary renal disease.

Dosage.—From 0.5 to 4 Gm. (10 to 60 grains). Urea is given in solution, or it may be enclosed in cachets.

VERONAL.—Veronalmum. — *Acidum Diethyl-Barbituricum.* — Diethyl Malonyl Urea. — *Malo-Urea.*—Veronal is diethyl-barbituric acid, 2,4,6-trioxy-5-diethyl pyrimidin,



a ureide derived from diethylmalonic acid, $\text{COOH.C}(\text{C}_2\text{H}_5)_2\text{COOH}$, and urea, $\text{CO}(\text{NH}_2)_2$.

It may be prepared by the interaction of esters of diethylmalonic acid with urea in the presence of metallic alcoholates. (U. S. patent No. 782,739.) It is also obtained by condensation of diethylcyanacetic ester with urea by means of sodium alcoholate.

It is a white, crystalline powder, melting at about 188°C . (370.4°F), odorless and faintly bitter. It is soluble in about 150 parts of cold water and in about 12 parts of boiling water. It is quite soluble in ether, acetone and ethyl acetate; also slightly soluble in chloroform, petroleum benzine, acetic acid and amyl alcohol. It forms salts with alkalies which are soluble in water.

Prolonged heating with sodium carbonate solution liberates ammonia. Deniges' reagent produces a white precipitate; Millon's

reagent produces in solution acidulated with nitric acid a precipitate soluble in an excess of the reagent.

Actions and Uses.—Diethyl-barbituric acid is quickly absorbed, especially when it is given in solution. In small doses it induces sleep apparently without any other effect. In larger doses the temperature falls and animals show marked trembling and restlessness in their sleep. In small doses it is a relatively safe hypnotic, but fatalities have followed its indiscriminate use.

It is claimed to be useful in simple insomnia, as well as in that accompanying hysteria, neurasthenia and mental disturbances.

Dosage.—From 0.3 to 1 Gm. (5 to 15 grains) in hot water, tea or milk, or, if in wafers or capsules, followed by a cupful of some warm liquid.

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany, and E. Merck, Darmstadt, Germany (Farbenfabriken of Elberfeld Co., New York, and Merck & Co., New York). U. S. patent No. 782,739 (Feb. 14, 1905; expires 1922). U. S. trademark.

Veronal Tablets, 5 grains.—Each tablet contains veronal 0.33 Gm. (5 grains).

ZINC PERMANGANATE.—Zinci Permanganas.—Zinc permanganate, $\text{Zn}(\text{MnO}_4)_2 \cdot 6\text{H}_2\text{O}$, is the zinc salt of permanganic acid. It should contain not less than 90 per cent. of zinc permanganate.

Zinc permanganate occurs in dark brown, nearly black, lustrous deliquescent crystals, or crystalline masses. It is readily soluble in water (1 in 3), generally leaving a slight residue. Aqueous solutions decompose in air, but are permanent if kept in well-closed bottles, protected from light. When heated slowly it loses water of crystallization (25.46 per cent.) and oxygen, leaving a residue of zinc manganite. If heated quickly it gives off pink vapors, or more properly, a fine dust of manganese trioxid. Zinc permanganate gives up oxygen more easily than does the potassium salt, hence great care should be taken in bringing it in contact with easily oxidizable substances.

Zinc permanganate should be almost completely soluble in water. The color of the solution is discharged by alcohol, hydrogen sulphid, ferrous sulphate, oxalic acid, or hydrogen dioxid, especially if the solution is first rendered acid with sulphuric acid.

If 1 Gm. of the salt is dissolved in 50 Cc. of water and 5 Cc. of alcohol added, a colorless solution must be obtained after boiling and filtering; if a small part of the latter acidified with nitric acid is tested with silver nitrate T. S. for chlorid and with barium chlorid T. S. for sulphate, not more than traces of either should be indicated.

If zinc permanganate be examined by the method given below the residual titration should indicate the presence of not less than 90 per cent. zinc permanganate ($\text{Zn}(\text{MnO}_4)_2 \cdot 6\text{H}_2\text{O}$). 0.1 to 0.2 Gm. of substance is weighed, dissolved in water, filtered through asbestos, the filtrate acidulated with 5 Cc. dilute sulphuric acid, warmed to about 60° C., treated with an excess of tenth-normal oxalic acid V. S., and the excess of oxalic acid determined by titration with tenth-normal potassium permanganate V. S. Each cubic centimeter of tenth-normal oxalic acid V. S. consumed indicates 0.0040842 Gm. zinc permanganate, $\text{Zn}(\text{MnO}_4)_2 \cdot 6\text{H}_2\text{O}$.

Action and Uses.—Zinc permanganate resembles the potassium salt in its oxidizing properties, but is more astringent. It is antiseptic. It is used chiefly in urethritis, either as an injection or as a urethral douche.

Dosage.—Locally 1 part to 4,000 (1 grain in 8 fluidounces). 1.3 Gm. zinc permanganate is equal in permanganate content to 1 Gm. potassium permanganate.

Non-Proprietary Preparations:

Zinc Permanganate, P-W-R.—Manufactured by the Powers-Weightman-Rosengarten Co., Philadelphia, Pa.

Zinc Permanganate, Merck.—Manufactured by E. Merck, Darmstadt, Germany (Merck & Co., New York).

Tablets Zinc Permanganate, 1 grain, Mulford.—Each tablet contains zinc permanganate 0.065 Gm. (1 grain). Prepared by the H. K. Mulford Co., Philadelphia, Pa.

"Soloid" Zinc Permanganate, 1/4 grain, B. W. & Co.—Each tablet contains zinc permanganate 0.088 Gm. (1 1/4 grains). Prepared by Burroughs, Wellcome & Co., London and New York.

PROPRIETARY ARTICLES NOT MENTIONED IN APPENDIX.

This is an index to the proprietary articles, arranged under the names of the manufacturers or their agents, which, so far as known to the Council on Pharmacy and Chemistry of the American Medical Association, comply with the rules, but which do not possess sufficient originality to be admitted to the body of the text.

Borcherdt Malt Extract Co., Chicago.

Borcherdt's Malt Extract Plain.—A preparation essentially equivalent to Extractum Malti U. S. P. and containing 10 per cent. of glycerine. U. S. trademark Nos. 64,467, 64,481.

Borcherdt's Malt Olive with Hypophosphates.—Each 100 Cc. is said to contain Borcherdt's Malt Extract 70 Cc., California olive oil 20 Cc., C. P. glycerine 10 Cc., calcium hypophosphite 0.64 Gm. (3 grains in a fluidounce), sodium hypophosphite 0.64 Gm. (3 grains in a fluidounce). U. S. trademark Nos. 60,422, 64,467.

Borcherdt's Malt Soup Extract.—Borcherdt's Malt Soup Extract is a mixture obtained by adding potassium carbonate 1.1 Gm. to each 100 Gm. of Borcherdt's Malt Extract, diluted with one-half its volume of distilled water, and evaporating in vacuo to a specific gravity of 1.41. U. S. trademark No. 64,467.

Burroughs, Wellcome & Co., New York.

Emule Soap Compound.—A cocoa butter suppository weighing 2.52 Gm. (39 grains) and containing in each suppository curd soap and dry sodium sulphate 0.464 Gm. (7 grains) of each.

Kaile & Co., New York.

Menthol-Iodol.—A mixture of iodol, 99 parts, and menthol, 1 part. Trademarked in Germany. No U. S. patent or trademark.

Malt-Diatase Co., New York.

Maltsyme.—A preparation essentially equivalent to Extractum Malti U. S. P. and containing 7 per cent. of alcohol. U. S. trademark No. 46,-459.

Maltsyme with Cod Liver Oil.—Said to consist of maltsyme concentrated and brought back to its original volume by the addition of 25 per cent. of Lofoten cod liver oil.

Maltsyme with Cascara Sagrada.—Each 100 Cc. is said to represent cascara bark, 10 Gm. (48 grains in a fluidounce).

Maltsyme with Hypophosphites.—Each 100 Cc. is said to contain calcium, sodium and potassium hypophosphites, of each 0.4 Gm. (3 grains in a fluidounce) and iron and manganese hypophosphites, of each, 0.05 Gm. ($\frac{1}{4}$ grain in a fluidounce).

Maltsyme with Phosphate of Iron, Quinine and Strychnine.—Each 100 Cc. is said to contain iron pyrophosphate, 0.85 Gm. (4 grains in a fluidounce); quinine, 0.20 Gm. (1 grain in a fluidounce); strychnine, 0.0066 Gm. ($\frac{2}{75}$ of a grain in a fluidounce).

Maltsyme Ferrated.—Each 100 Cc. is said to contain iron pyrophosphate, 1.65 Gm. (8 grains in a fluidounce).

Maltsyme with Yerba Santa.—Each 100 Cc. is said to represent yerba santa leaves, 6.6 Gm. (30 grains in a fluidounce).

The Maltine Company, Brooklyn, N. Y.

Maltine.—A preparation essentially equivalent to Extractum Malti U. S. P. and containing 3.88 per cent. alcohol. U. S. trademark No. 44,556.

Maltine with Cascara Sagrada.—Each 100 Cc. is said to represent cascara sagrada (*Rhamnus Purshiana*) 12.5 Gm. (60 grains in a fluidounce) in a mixture containing maltine 96.115 per cent. and alcohol 3.885 per cent.

Maltine with Cod Liver Oil.—A liquid said to represent maltine, 56.115 per cent.; glycerine, 10 per cent.; cod-liver oil, 30 per cent.; alcohol, 3.885 per cent.

Maltine with Creosote.—Each 100 Cc. is said to represent beechwood creosote, 0.83 Cc. (4 minims in a fluidounce) in a mixture containing maltine, 96.115 per cent., and alcohol, 3.885 per cent.

Maltine Ferrated.—Each 100 Cc. is said to represent iron pyrophosphate, 1.65 Gm. (8 grains in a fluidounce) in a menstruum containing maltine, 96.115 per cent., and alcohol, 3.885 per cent.

Maltine with Hypophosphites.—Each 100 Cc. is said to contain calcium hypophosphite, 0.64 Gm. (3 grains in a fluidounce) sodium hypophosphite, 0.64 Gm. (3 grains in a fluidounce), and iron hypophosphite, 0.42 Gm. (2 grains in a fluidounce), dissolved in a solution of ammonium citrate and to contain maltine, 96.115 per cent., and alcohol, 3.885 per cent.

Maltine with Olive Oil and Hypophosphites.—A preparation said to consist of maltine, 65 per cent.; pure olive oil, 25 per cent.; glycerine, 10 per cent.; to which per 100 Cc. there is added calcium hypophosphite, 0.6 Gm. (3 grains per fluidounce); sodium hypophosphite, 0.6 Gm. (3 grains per fluidounce).

Maltine with Phosphate of Iron, Quinia and Strychnia.—Each 100 Cc. is said to represent iron pyrophosphate, 0.83 Gm. (4 grains in a fluidounce); quinine sulphate, 0.21 Gm. (1 grain in a fluidounce); strychnine (alkaloid), 0.0066 Gm. (2/75 grain in a fluidounce) dissolved in a solution of ammonium citrate and to contain maltine, 96.115 per cent., and alcohol, 3.885 per cent.

Maltine with Wine of Pepsin.—A liquid said to consist of maltine, 27.5 per cent.; wine of pepsin, 71.5 per cent., and fluid extract of gentian, 1 per cent., the percentage of alcohol in the mixture being 18 per cent.

Malto-Yerbine.—A liquid said to contain in each 100 Cc. an extract of 6.6 Gm. (30 grains in a fluidounce) of eriodictyon (*yerba santa*), also flavoring composed of the essential oils of anise, cassia, coriander and caraway in a mixture containing maltine, 96.115 per cent., and alcohol, 3.885 per cent.

The extract of yerba santa employed in malto-yerbine is prepared as follows:

The leaves of yerba santa in coarse powder are boiled under pressure for six hours and inert matter separated by a filter press. The filtrate is concentrated with a certain quantity of maltine at a high temperature until the product has reached a density of 1.35. This extract is mixed in proper proportions with maltine of extra diastasic strength to make up for the diastasic strength lost through heat during the concentration of the drug with maltine.

Manhattan Eye Salve Co., Owensboro, Ky.

Argyrol Ointment (M. E. S. Co.)—An ointment said to consist of argyrol 10 per cent.; hydrous wool fat, 25 per cent.; white petrolatum, 65 per cent. Put up in collapsible tubes, for application to the eye.

Compound Yellow Oxide and Adrenalin Ointment (M. E. S. Co.)—An ointment said to contain yellow oxide of mercury 1 per cent., solution of adrenalin chloride 5 per cent., menthol 0.04 per cent., phenol 0.2 per cent., hydrous wool fat, 25 per cent.; white petrolatum sufficient to make 100 per cent. Put up in collapsible tubes, for application to the eye.

Cocaine and Adrenalin Ointment (M. E. S. Co.)—An ointment said to contain cocaine hydrochloride 2 per cent. solution of adrenalin chloride 17 per cent. hydrous wool fat 25 per cent., white petrolatum sufficient to make 100 per cent. Put up in collapsible tubes, for application to the eye.

Dionin Ointment (M. E. S. Co.)—An ointment said to consist of dionin 5 per cent.; white petrolatum, 95 per cent. Put up in collapsible tubes, for application to the eye.

Holocain and Adrenalin Ointment (M. E. S. Co.)—An ointment said to consist of holocain 1 per cent.; adrenalin chloride, 4 per cent.; hydrous wool fat, 10 per cent.; white petrolatum, 85 per cent. Put up in collapsible tubes for application to the eye.

H. K. Mulford Co., Philadelphia, Pa.

Methyl-Santal.—Each capsule is said to contain: Methylene blue, 0.06 Gm. (1 grain); oleoresin of copabia, 0.1 Cc. (1 3/5 minims); oleoresin of cubebs, 0.025 Cc. (2/5 minim); oil of sandalwood, 0.09 Cc. (1 1/4 minims); oil of cinnamon, 0.013 Cc. (1/5 minim); oil of nutmeg, 0.005 Cc. (1/12 minim).

Granular Effervescent Sodium Sulphate (Glauber's Salt), Mulford.—A mixture said to contain in each 100 Gm.: Dried sodium sulphate, 40 Gm., with an effervescent mixture consisting of sodium bicarbonate, citric acid, tartaric acid and sugar.

Granular Effervescent Bromide and Acetanilide Compound, Mulford.—A mixture said to contain in each 100 Gm.: Sodium bromide, 5 Gm., acetanilide, 1.5 Gm., and saccharin, 0.014 Gm., with an effervescent base consisting of sodium bicarbonate and citric and tartaric acids.

Granular Effervescent Caffeine and Sodium Bromide Compound, Mulford.—A mixture said to contain in each 100 Gm.: Sodium bromide, 5.45 Gm.; caffeine, 0.545 Gm.; and saccharin, 0.014 Gm., with an effervescent base consisting of sodium bicarbonate and citric and tartaric acids.

Granular Effervescent Caffeine and Potassium Bromide, Mulford.—A mixture said to contain in each 100 Gm.: Potassium bromide, 3.3 Gm.; caffeine, 0.122 Gm.; and saccharin, 0.014 Gm., with an effervescent mixture consisting of sodium bicarbonate and citric and tartaric acids.

Granular Effervescent Carlsbad Salt (Artificial), Mulford.—A mixture said to contain in each 100 Gm.: Potassium sulphate, 0.35 Gm.; sodium chloride, 3.266 Gm.; sodium bicarbonate, 6.533 Gm., and sodium sulphate (dried), 8 Gm., with an effervescent base consisting of sodium bicarbonate and citric and tartaric acids.

Lozenges Adrenal Comp.—Lozenges each containing suprarenal gland 0.01 Gm. (1/6 grain), menthol 0.0013 Gm. (1/50 grain), benzoic acid 0.0026 Gm. (1/24 grain), eucalyptol 0.0013 Gm. (1/50 grain), together with sufficient powdered sugar.

Ointment Cargentos and Ichthyol.—An ointment consisting of cargentos (colloidal silver oxide) 5 per cent. and ichthyol 5 per cent. in a base consisting of petrolatum, with a small amount of yellow wax.

Rectal Suppositories Adrenal.—Suppositories each containing dried suprarenal gland 0.3 Gm. (5 grains), together with oil of theobroma and wax.

Syrup of Quinine with Chocolate.—Each 100 Cc. contains in suspension, quinine sulphate 2.156 Gm. (10 grains in a fluidounce), chloroform as a preservative 0.43 Cc. (2 minims in a fluidounce), in a syrup flavored with yerba santa, chocolate and vanillin.

National Pharmacy Co., Oakland, Cal.

Bismuthal.—A milky liquid, said to contain in 100 Cc.: Lac bismuthi citratis, 44 Cc.; pepsin, 3.30 Gm.; hydrochloric acid, 0.013 Gm.; lactic acid, 0.013 Gm.; glycerine, 40 Gm., and alcohol, 5 Cc.; cherry laurel water, 1.66 Cc.; Jamaica ginger, 0.26 Gm.; gum benzoin, 0.59 Gm.

Lac bismuthi citratis contains 7.60 per cent. of anhydrous bismuth citrate.

Pitman-Myers Co., Indianapolis, Ind.

Aromatic Cordial, P.-M. Co.—Aromatic cordial is a mixture said to contain in each 100 Cc.: Papain, 0.4 Gm., and lactic acid, 0.625 Cc. in a menstruum consisting of glycerine wine, aromatics, sugar, and 5 per cent. of alcohol. One fluidram is said to contain papain, 1/4 grain, and lactic acid, 4/10 minim.

Elixir Buchu, Juniper and Acetate Potassium, P.-M. Co.—Each 100 Cc. is said to represent: Buchu, 16.6 Gm.; juniper berries, uva ursi, of each 8.3 Gm.; potassium acetate, 5 Gm. Each fluidram is said to represent: Buchu, 10 grains; juniper berries, uva ursi, of each, 5 grains, and potassium acetate, 3 grains.

Oleum Ricini Dulce, P.-M. Co.—Castor oil to which has been added saccharin 0.07 Gm. in 100 Cc. (0.33 in a fluidounce) and aromatics; contains 2.5 per cent. alcohol.

Syrup Cannabie Compound.—Each 100 Cc. is said to represent: Cannabis indica, 1.66 Gm. (7 1/2 grains in a fluidounce); heroin hydrochloride, 0.066 Gm. (1/3 grain in a fluidounce); chloroform, 0.53 Cc. (4 minims in a fluidounce); lobelia, 1.66 Gm. (7 1/2 grains in a fluidounce); antimony and potassium tartrate (tartar emetic), 0.026 Gm. (1/4 grain in a fluidounce), with aromatics; alcohol, 10 per cent.

Tablets Acet-Phenetidin Compound, P.-M. Co.—Tablets, each stated to contain acet-phenetidin 0.23 Gm. ($\frac{3}{4}$ grains); caffeine, 0.016 Gm. ($\frac{1}{4}$ grain) and sodium bicarbonate, 0.08 Gm. ($\frac{1}{4}$ grains).

Reinschlid Chemical Co., New York.

Extractum Chinæ Nanning.—A liquid extract of red cinchona said to contain cinchona alkaloids 5 per cent., cinchona tannins 7.5-10 per cent., glycerine 30 per cent., water 55-57.5 per cent.

Dosage.—From 1 to 1.35 Gm. (15 to 20 minims) three times a day.

Russell & Lawrie, Tarrytown, New York.

Lubræptic.—Lubræptic is a jelly prepared from Chondrus (Irish moss) containing 2 per cent. boric acid and 0.067 per cent. formaldehyde. The material is packed in screw cap metal tubes and sterilized by heat.

Dosage.—It is put up in collapsible tubes and it is suggested to reject the portion first expressed to make sure of the sterile condition of that used.

Sharp & Dohme, Baltimore, Md.

Liquor Santalæ.—Liquor Santali et Copaibæ Compositus, S. & D.—Each 100 Cc. contains santal oil 1 Cc. (5 minims in a fluidounce) and copaiba 2 Cc. (10 minims in a fluidounce) dissolved in 55 per cent. alcohol with addition of aromatic oils.

H. K. Wampole Co., Philadelphia.

Colchic-Methyl Capsules.—Each capsule contains: Colchicine, 0.00025 Gm. ($\frac{1}{250}$ grain); phenyl salicylate (salol), 0.13 Gm.

Glycerodine.—Glyceritum acid hydriodici. A solution of hydrogen iodide in glycerine said to contain in each 100 Cc. hydrogen iodide (absolute hydriodic acid) 1.54 Gm. (7 grains in a fluidounce).

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This does not pretend to be a full bibliography, but only comprises a few references to some of the later literature on subjects briefly mentioned in the text.

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CHAPTER XVIII.

Emetine in Amebic Dysentery.

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CHAPTER XXIII.

Quinine in Gonorrhea.

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CHAPTER XXV.

Tyramine.

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ACIDUM ACETICUM. —Acetic Acid.—36 per cent. absolute acid. Uses: Caustic; for removal of warts.	
ACIDUM ACETICUM DILUTUM. —Diluted Acetic Acid.—6 per cent. absolute acid. Uses: Refrigerant; for preparing acetates. Liquor Ammonii Acetatis, U. S.	
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[Note.—See General Index for New and Nonofficial Remedies and other items not mentioned in this index.]

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ACIDUM CITRICUM. —Citric Acid.—Obtained from Limes or Lemons. Crystals, readily soluble in water, alcohol and in 18 parts ether. Dose: 0.5 Gm., or 7½ grains.	
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ACIDUM HYDROCHLORICUM DILUTUM. —Diluted Hydrochloric Acid.—10 per cent. absolute HCl.....	125
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ACIDUM HYPOPHOSPHOROSUM DILUTUM. —Diluted Hypophosphorus Acid.—10 per cent. absolute acid. Dose: 0.5 Cc., or 8 minims.	
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- ACIDUM OLEICUM.**—Oleic Acid.—An acid from Fat.
Yellowish liquid, s. g. 0.895; insoluble in water, soluble in alcohol, ether, chloroform, benzol, fixed and volatile oils.
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- ACIDUM PHOSPHORICUM DILUTUM.**—Diluted Phosphoric Acid.
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Light, white needles, or crystalline powder; soluble in 808 parts water, 2 parts alcohol, also soluble in ether, chloroform or fixed oils.
See also Methyl Salicylas, Oleum Betulæ, Oleum Gaultheriæ.
Dose: 0.5 Gm., or 7½ grains.
Pulvis Antisepticus, N. F.
Pulvis Talci Salicylicus, N. F.
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- ACIDUM SULPHURICUM.**—Sulphuric Acid—92.5 per cent. absolute H_2SO_4 205
Heavy, oily, corrosive liquid, s. g. 1.826; miscible in all proportions with water and alcohol with evolution of heat.
Caution.—In diluting, the acid should be added to the water or other diluent, and not the reverse.
- ACIDUM SULPHURICUM AROMATICUM.**—Elixir of Vitriol.
Contains about 10 per cent. sulphuric acid in alcohol, with aromatics.
Dose: 1 Cc., or 15 minims, diluted with water, syrups, etc.
- ACIDUM SULPHURICUM DILUTUM.**—Diluted Sulphuric Acid.—
10 per cent. H_2SO_4 .
Dose: 2 Cc., or 30 minims (diluted).
- ACIDUM SULPHUROSUM.**—Sulphurous Acid.—6 per cent. absolute SO_2 .
Liquid, s. g. 1.028, completely volatilized by heat.
Uses: Bleaching agent; disinfectant; germicide by spraying or volatilizing in rooms; usually effected by burning sulphur, which see. Rarely internally; the sulphites used instead.
Dose: 2 Cc., or 30 minims (diluted).
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Light, greenish-yellow crusts or powder, soluble in less than its weight of water or alcohol, in 3 parts glycerine.
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Unguentum Acidi Tannici, U. S.—20 per cent.
Collodium Stypticum, U. S.—20 per cent.
Trochisci Acidi Tannici, U. S.—0.06 Gm. (1 grain).
Dose: 0.5 Gm., or 7½ grains.
- ACIDUM TARTARICUM.**—Tartaric Acid.—Obtained from Argol.
Crystals or white powder, very soluble in water or alcohol, but not in ether (distinction from citric acid).
Dose: 0.5 Gm., or 7½ grains.
- Acidum Tartaricum Saccharatum, N. F.**—For extemporaneous preparation of Effervescent Powders, N. F.

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ACONITUM. —Root <i>Aconitum Napellus</i> .—Not less than 0.5 per cent. Aconitine. Dose: 0.065 Gm., or 1 grain. Tinctura Aconiti, U. S.—10 per cent. Dose: 0.6 Cc., or 10 minims. Caution.—Tincture of Aconite, formerly official, was 35 per cent. drug-strength, being, therefore, nearly four times as strong as the tincture, now official. To avoid dispensing the tincture of the former strength, the Tincture of the U. S. P. VIIIth (or 10 per cent.) should be specified. Fluidextractum Aconiti, U. S.—Dose: 0.05 Cc., or 1 minim.	
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ADEPS LANÆ. —Wool fat.—The purified fat from sheep's wool.	
ADEPS LANÆ HYDROSUS. —Hydrated Wool Fat.—“Lanolin.”— Wool fat mixed with 30 per cent. of water. A cholesterin, capable of absorbing more than its weight of water; not saponified by alkalis and immune from rancidity, penetrating the skin and, therefore, preferable to animal or vegetable fats or oils as a vehicle for medicinal agents intended for systemic or constitutional effects. See <i>Unguentum Hydrargyri Oxidi Flav.</i> , etc.	
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ÆTHER. —Ether.—96 per cent. absolute Ether.....	34
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ÆTHER ACETICUS. —Acetic Ether.—90 per cent. Ethyl Acetate. Liquid, s. g. 0.883, volatile, agreeable odor. Dose: 1 Cc., or 15 minims.	
ÆTHYLIS CARBAMAS. —Ethyl Carbamate—“Urethane.”—Ester of Carbamic Acid obtained by reaction of ethyl alcohol on Carbamide (urea) or one of its salts.....	59
White, colorless crystals or scales, soluble in less than their weight of water, readily in other solvents. Incompatible with: Alkalies, acids and most other chemicals. Dose: 1 Gm., or 15 grains (in capsules).	
ÆTHYLIS CHLORIDUM. —Ethyl Chloride.—“Kelene.” Highly volatile liquid, s. g. 0.918; must be kept in hermetically sealed glass tubes; highly inflammable, should be kept removed from lights. Dose: To effect anæsthesia, 15 Cc., or 4 fluidrams.	
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- ALOE PURIFICATA.**—Purified Aloes.—Aloes purified by melting and straining; in pieces or powder form.
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Tinctura Aloes et Myrrhæ, U. S.—Dose: 2 Cc.
Extractum Aloes, U. S.—Dose: 0.125 Gm. or 2 grains.
Pilulæ Aloes, U. S.—Dose: 2 pills.
Pilulæ Aloes et Ferri, U. S.—Dose: 2 pills.
Pilulæ Aloes et Mastiches, U. S.—Dose: 2 pills.
Pilulæ Aloes et Myrrhæ, U. S.—Dose: 2 pills.
Tinctura Antiperiodica, N. F.
Tinctura Benzoini Composita, U. S.—Dose: 1 Cc., or 15 minims.
Extractum Colocynthis Compositum, U. S.—Dose: 0.5 Gm., or 7½ grains.
Pilulæ Rhei Compositæ, U. S.—Dose: 2 pills.
Pilulæ Cathartice Compositæ, U. S.—Dose: 2 pills.
Pilulæ Cathartice Vegetabiles, U. S.—Dose: 2 pills.
Pilulæ: ad Prandium (Dinner Pills), *Laxativæ*, *Quadruplices* and *Triplices*, see N. F.
- ALOINUM.**—*Aloin*.—Neutral principle from Aloes
Lemon-yellow powder, or orange-colored crystals; soluble in 65 parts water, in 10.75 alcohol.
Dose: 0.065 Gm., or 1 grain.
Pilulæ Laxativæ Compositæ, U. S.
Pilulæ Aloini Compositæ, N. F.
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- ALUMEN.**—*Alum*.—Aluminum and Potassium Sulphate..... 112
Large, translucent crystals, or white powder; soluble in 9 parts water, in 0.3 boiling water, freely soluble in warm glycerine; insoluble in alcohol.
Dose: 0.5 Gm., or 8 grains (rarely internally).
- ALUMEN EXSICCATUM.**—Exsiccated or "dried" Alum.—Alum deprived of its water of crystallization by heating.
White, granular powder; soluble in 17 parts of water and in 1.4 parts boiling water. It is nearly twice as strong as the crystallized alum.
- ALUMINI HYDROXIDUM.**—(*Alumini Hydras*, U. S. '90).—"Aluminum Hydrate."
- ALUMINI SULPHAS.**—Aluminum Sulphate.
Crystalline powder, or in crystals or pencils.
Uses: Caustic, astringent (in pencils).
- AMMONII BENZOAS.**—Ammonium Benzoate.
White flakes, or crystalline powder; soluble in 10.5 parts water, in 25 parts alcohol.
Dose: 1 Gm., or 15 grains; in solution or liquid mixtures.
- AMMONII BROMIDUM.**—Ammonium Bromide.
Transparent crystals, or white crystalline powder; soluble in 1.3 parts water, in 12.5 parts alcohol.
Dose: 1 Gm., or 15 grains; in powder, capsule or solution.
Elixir Ammonii Bromidi, N. F.—Dose: 4 Cc., or 1 fluidram.
- AMMONII CARBONAS.**—Ammonium Carbonate.—Mixture of acid carbonate and ammonium carbamate.
White, internally translucent, masses; soluble in 4 parts water; decomposed by heat.

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Dose: 0.25 Gm., or 4 grains.	
Liquor Ammonii Acetatis, U. S.—Dose: 16 Cc., or 4 fluidrams.	
Spiritus Ammoniae Aromaticus, U. S.—Dose: 2 Cc., or 30 minims (diluted).	
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White, crystalline powder, obtained by purifying sal ammoniac; soluble in 2 parts water, 1 part boiling water, 50 parts alcohol and 5 parts glycerine.	
Dose: 0.5 Gm., or 8 grains.	
Mistura Ammonii Chloridi, N. F.—Dose: 8 Cc., or 2 fluidrams.	
AMMONII IODIDUM. —Ammonium Iodide.	
Colorless crystals, or white granular powder, on exposure rapidly becoming colored and acquiring an iodine odor; soluble in 0.6 parts water, in 9 parts alcohol.	
Dose: 0.25 Gm., or 4 grains.	
AMMONII SALICYLAS. —Ammonium Salicylate.	
Colorless prisms, or white crystalline powder; soluble in 0.9 parts water, in 2.3 parts alcohol.	
Dose: 0.25 Gm., or 4 grains.	
AMMONII VALERAS. —Ammonium Valerate (Ammonii Valerianas, U. S. '90).	
Colorless, or opaque plates, very soluble in water and alcohol; deliquescent, losing ammonia.	
Dose: 0.5 Gm., or 8 grains.	
Elixir Ammonii Valerianatis, N. F.—Dose: 4 Cc., or 1 fluidram.	
AMYGDALA AMARA. —Bitter Almond.	
AMYGDALA DULCIS. —Sweet Almond.	
AMYLIS NITRIS. —Amyl Nitrite.—80 per cent.....	79
Liquid, s. g. 0.865, exceedingly volatile, insoluble in water, miscible in all proportions with alcohol and ether.	
Dose: 0.2 Cc., or 3 minims (or one pearl).	
AMYLUM. —Starch.—Corn Starch.....	197
White powder, or masses; insoluble in water; soluble in boiling water.	
Glyceritum Amyli, U. S.—10 per cent.	
ANISUM. —Fruit Pimpinella Anisum.	
ANTHEMIS. —Flowerheads Anthemis nobilis.	
ANTIMONII ET POTASSII TARTRAS. —Tartar Emetic.....	149
Crystals, or white granular powder, soluble in 15.5 parts water, insoluble in alcohol.	
Dose: Expectorant: 0.005, equal to 5 mg., or 1/10 grain.	
Emetic 0.03 Gm., or ½ grain.	
Vinum Antimonii, U. S. (0.4 per cent.).—Dose: 1 Cc., or 15 minims.	
Syrupus Scillae Compositus, U. S. (0.2 per cent.).—Dose: 2 Cc., or 30 minims.	
ANTIPYRINA. —Antipyrine — Phenyl-dimethyl-pyrazolon. — Methylated derivative of Phenyl-hydrazine, condensed with acetoacetic ether.....	157
Colorless, crystalline powder, or crystals, readily soluble in water, alcohol and chloroform. This and Resorcinol are the only so-called coal-tar products readily soluble in water.	
Incompatible with sweet spirits of nitre.	
Dose: 0.25 Gm., or 4 grains.	

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APOCYNUM.—Rhizome of <i>Apocynum cannabinum</i>	139
Dose: 1 Gm., or 15 grains.	
Fluidextractum Apocyni, U. S.—Dose: 1 Cc., or 15 minims.	
APOMORPHINÆ HYDROCHLORIDUM.—Apomorphine Hydrochloride.—Alkaloid prepared from Morphine.	144, 149
Grayish-white prisms, acquiring a greenish tint upon exposure to light and air; soluble in 39.5 parts water, 38.2 parts alcohol, sparingly in chloroform and ether.	
Doses: Expectorant: 0.002 Gm., equal to 2 mg., or 1/30 grain. Emetic 0.005 Gm., equal to 5 mg., or 1/10 grain.	
AQUA.—Water—H ₂ O.—Potable water in its purest attainable state. The following adjectives are used in prescriptions: <i>Aquæ puræ</i> ; <i>A. fontanæ</i> , fountain; <i>A. pluvialis</i> , rain; <i>A. frigida</i> , cold; <i>A. fervida</i> , hot; <i>A. bullientis</i> , boiling; <i>A. sterilata</i> , sterile.	
AQUA AMMONIÆ.—Ammonia Water.—10 per cent. NH ₃	87
AQUA AMMONIÆ FORTIOR.—Stronger Ammonia Water.—28 per cent. NH ₃ .	
AQUÆ MEDICATÆ.—MEDICATED WATERS.	
Solutions of volatile oils, or other volatile principles, in water; with one exception they are saturated solutions.	
AQUA AMYGDALÆ AMARÆ.—Bitter Almond Oil—1 Cc. in 1,000 Cc.	199
Dose: 4 Cc., or 1 fluidram.	
AQUA ANISI.—Oil of Anise—2 Cc. in 1,000 Cc.	
Dose: 16 Cc., or 4 fluidrams.	
AQUA AURANTII FLORUM.—Equal volume of orange flower water and distilled water.	199
AQUA CAMPHORÆ.—Containing Camphor—8 Gm. in 1,000 Cc., or about 3½ grains in 1 fluidounce.	
Dose: 8 Cc., or 2 fluidrams (about 1 gr. camphor).	
AQUA CHLOROFORM.—Saturated solution of chloroform; about 5 parts in 1,000.	
Dose: 16 Cc., or 4 fluidrams (containing about 1 minim chloroform).	
AQUA CINNAMOMI.—Containing oil of cinnamon, 2 Cc. in 1,000 Cc.	199
Dose: 16 Cc., or 4 fluidrams.	
AQUA CREOSOTI.—Containing creosote, 1 in 100 Cc.	
Dose: 8 Cc., or 2 fluidrams (containing about 1 minim).	
AQUA DESTILLATA.—Distilled Water.	
Only when freshly prepared and properly preserved is it sterile. Distilled water should not be relied on for sterile water, but the water or solution made with it should be ordered sterilized.	
AQUA FOENICULI.—Containing oil of fennel, 2 in 1,000 Cc.	
Dose: 16 Cc., or 4 fluidrams.	
AQUA HAMAMELIDIS.—Witch Hazel Water (distilled extract of witch hazel).	
A saturated solution of the volatile principles of the witchhazel bark, obtained by distillation with water and addition of 15 per cent. (vol.) alcohol.	
Dose: 8 Cc., or 2 fluidrams.	

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AQUA HYDROGENII DIOXIDI. —Peroxide of Hydrogen.—3 per cent. H_2O_2	202
A saturated solution of H_2O_2 in water, yielding 10 times its volume of available oxygen.	
Dose: 4 Cc., or 1 fluidram.	
AQUA MENTHÆ PIPERITÆ. —Containing oil of peppermint, 2 in 1,000 Cc.	199
Dose: 16 Cc., or 4 fluidrams (containing about $\frac{1}{2}$ min. oil).	
AQUA MENTHÆ VIRIDIS. —Containing oil of spearmint, 2 in 1,000 Cc.	
AQUA ROSÆ. —Strong rose water and distilled water, equal volumes.	199
Dose: 16 Cc., or 4 fluidrams.	
Aqua Sedativa, N. F. —Lotio Ammoniacalis Camphorata (Codex).—Amm. water, 12.5 Cc.; spirit camphor, 1.2 Cc.; sodium chloride, 6.5 Gm., in water, to 100 Cc.	
Dose: 8 Cc., or 2 fluidrams.	
ARGENTI CYANIDUM. —Silver Cyanide.—AgCN.	
ARGENTI NITRAS. —Silver Nitrate.—AgNO ₃	110, 203
Transparent, tabular crystals, soluble in 0.54 parts water, in 24 parts alcohol. Decomposed by organic matter, being reduced and assuming a gray color. It should be kept free from contact with organic substances; the crystals should be kept in glass-stoppered containers.	
Solution should be prepared with pure and sterile distilled water and kept in glass-stoppered bottles, which need not be of colored glass if they are not exposed to strong light, or direct sunlight.	
Dose: 0.01 Gm., or 1/5 grain (in pill form only).	
ARGENTI NITRAS FUSUS. —Moulded Silver Nitrate (Lunar Caustic).	
Silver nitrate fused with 4 per cent. HCl, and moulded into pencils; containing about 5 per cent. silver chloride, and therefore less liable to break into pieces.	
ARGENTI NITRAS MITIGATUS. —Mitigated Caustic.—33 per cent. AgNO ₃	
Silver Nitrate, fused with twice its weight of Potassium Nitrate and molded into pencils.	
ARGENTI OXIDUM. —Silver Oxide.—Ag ₂ O.	
Heavy, dark-brown powder, insoluble in neutral liquids. Caution.—Explosive by concussion.	
Dose: 0.065, equal to 65 mg., or 1 grain; in pill form.	
ARGYROL. —A preparation of silver. Used in 10 to 50 per cent. solution.	226
ARNICA. —Flowers Arnica montana.	
Dose: 1 Gm., or 15 grains.	
Tinctura Arnicæ, U. S.	
ARSENI IODIDUM. —Arsenous Iodide—As I ₃ .—Containing not less than 82.7 per cent. Iodine and 16.3 per cent. Arsenic (Metallic).	
Orange-red, crystalline powder, soluble in 12 parts water and in about 28 parts alcohol.	
Dose: 0.005 Gm., equal to 5 mg., or 1/10 grain.	
Liquor Arseni et Hydrargyri Iodidi, U. S.—Dose: 0.1 Cc., or 1½ minims.	
ARSENI TRIOXIDUM. —As ₂ O ₃ .—(Acidum Arsenosum—Arsenous Acid, U. S. '90).	100
White powder, or in heavy masses, sparingly soluble in water (from 30 to 100 parts), sparingly in alcohol; soluble in 5 parts of glycerine and readily in acids and alkalis.	

- Dose:** 0.002 Gm., equal to 2 mg., or 1/30 grain.
Liquor Acidii Arsenosi, U. S. (1 per cent.)—**Dose:** 0.2 Cc., or 3 minims.
Liquor Arseni et Hydrargyri Iodidi, U. S. (1 per cent.)—**Dose:** 0.1 Cc., or 1½ minims.
Liquor Potassii Arsenitis, U. S. (1 per cent.)—**Dose:** 0.2 Cc., or 3 minims.
Liquor Sodii Arsenatis, U. S. (1 per cent.)—**Dose:** 0.2 Cc., or 3 minims.
 The four official solutions are all 1 per cent. strength, in conformity with the strength of the arsenical solutions of all the principal pharmacopœias as adopted by the International Conference for the Unification of Potent Remedies, 1902.
Liquor Auri et Arseni Bromidi, N. F.—**Dose:** 0.2 Cc., or 3 minims.
Liquor Potassii Arsenatis et Bromidi, N. F.—**Dose:** 0.2 Cc., or 3 minims.
Pilulæ Metallorum, N. F.
- ASAFŒTIDA**.—Gum resin from *Ferula foetida*..... 95
 Mass of about equal parts of resin and volatile oil soluble in alcohol and a gum soluble in water.
Dose: 0.25 Gm., or 4 grains (chiefly in pill).
Emulsum Asafœtidæ, U. S. (4 per cent.)—**Dose:** 16 Cc., or 4 fluidrams.
Tinctura Asafœtidæ, U. S. (20 per cent.)—**Dose:** 1 Cc., or 15 minims.
Pilulæ Asafœtidæ, U. S.—**Dose:** 2 pills.
Pilulæ Aloes et Asafœtidæ, N. F.
- ASPIDIUM**.—Rhizome *Dryopteris Filix-mas*..... 118
Oleoresina Aspidii, U. S.—**Dose:** 4 Gm., divided in 4 doses, followed by a purgative.
- ASPIRIN**.....184, 232
- ATROPINA**.—Alkaloid from *Atropa Belladonna*..... 61
 White prisms; soluble in 450 parts water (1 gr. to 1 fl. oz.), 1.54 parts alcohol, 1.56 parts chloroform and in 16.6 parts ether.
Poison.—See *Belladonna*.
Dose: 0.0004 Gm., equal to 0.4 mg., or 1/160 grain.
- ATROPINÆ SULPHAS**.—Atropine Sulphate.
 White, crystalline powder, needles, or prisms; very soluble in water (0.38 parts), in 3.7 parts alcohol, practically insoluble in ether and chloroform.
Dose: 0.0004 Gm., equal to 0.4 mg., or 1/160 grain.
- AURANTII AMARI CORTEX**.—Rind of *Citrus vulgaris*.
- AURANTII DULCIS CORTEX**.—Fresh rind of *Citrus Aurantium*.
- AURII ET SODII CHLORIDUM**.—Double Chloride Gold and Sodium.—Mixture of equal parts of anhydrous gold chloride and sodium chloride.
 Orange-yellow powder, deliquescent, very soluble in water.
Uses: Alterative, tonic and stimulant to the digestive system.
Dose: 0.005 Gm., equal to 5 mg., or 1/10 grain (in pill).
- BALSAMUM PERUVIANUM**.—Balsam from *Toluifera Pereiræ*... 154
 Thick, dark brown liquid, s. g. 1.14, completely soluble in absolute alcohol, chloroform and glacial acetic acid; partially soluble in 5 parts alcohol and in ether; very sparingly in water.
Dose: 1 Gm., or 15 grains.
Mistura Oleo-Balsamica, N. F.

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BALSAMUM TOLUTANUM. —Balsam from <i>Toluifera Balsamum</i> . Yellowish-brown, plastic mass, readily soluble in alcohol, chloroform and ether; very sparingly in water. Dose: 1 Gm., or 15 grains. Tinctura Tolutana, U. S. (20 per cent.). Dose: 2 Cc., or 30 minims Syrupus Tolutanus, U. S. (5 per cent. Tr.). Dose: 16 Cc., or 4 fluidrams. Tinctura Benzoini Composita, U. S.	
Balsamum Traumaticum , N. F.—Turlington's (Friar's) Balsam.— Tr. Benzoini Comp. U. S., is a simplified form of this prepara- tion.	
BASHAM'S MIXTURE.	140
BELLADONNÆ FOLIA. —Leaves of <i>Atropa Belladonna</i> . 0.3 per cent. Alkaloids.	60, 142, 150
Uses: Narcotic, anodyne, mydriatic, and internally to check excessive secretion; as corrective in purgatives. Ex- ternally in hemorrhoids; suppositories; ointments. Dose: 0.065 Gm., or 1 grain. Tinctura Belladonnæ Follorum, U. S. (10 per cent.).—Dose: 0.5 Cc., or 8 minims. Extractum Belladonnæ Follorum, U. S.—Dose: 0.010 Gm., equal 10 mg., or 1/5 grain. Emplastrum Belladonnæ, U. S.—(Av. 0.4 per cent. my- driatic alkaloids). Unguentum Belladonnæ, U. S.—(10 per cent. extract). Pilulæ Aloini, Strychninæ et Belladonnæ Compositæ, N. F.	
BELLADONNÆ RADIX. —Root of <i>Atropa Belladonna</i> .—0.45 per cent Alkaloids.	60
Dose: 0.045 Gm., or 3/4 grain. Fluidextractum Belladonnæ Radicis, U. S.—Dose: 0.05 Cc., or 1 minim. Linimentum Belladonnæ, U. S.	
BENZALDEHYDUM. —Aldehyde produced artificially, or obtained naturally, from Oil of Bitter Almond.	
BENZINUM. —Petroleum Benzin.	
BENZINUM PURIFICATUM. —"Deodorized Benzin."	
BENZOINUM. —Benzoin.—Balsamic resin from <i>Styrax Benzoin</i>	154
Mass, or whitish tears, agglutinated with resin; soluble in 5 parts alcohol, very sparingly in water. Dose: 1 Gm., or 15 grains. Tinctura Benzoini, U. S. (20 per cent.).—Dose: 1 Cc., or 15 minims. Tinctura Benzoini Composita, U. S.—Dose: 2 Cc., or 30 minims.	
BENZOL (Benzene).	113
Dose: 5 to 10 minims.	
BENZOSULPHINIDUM. —Saccharin. — Anhydride of orthosulph- amide-benzoic acid.	200
White, crystalline powder, soluble in 250 parts water, 25 parts alcohol, sparingly in ether and chloroform. With alk- alies it forms salts which are soluble in water. Dose: 0.200 Gm., or 3 grains. Liquor Saccharini, N. F., as an adjuvant.	
BERBERIS —Rhizome and roots <i>Berberis Aquifolium</i> and other species.	119
Dose: 2 Gm., or 30 grains. Fluidextractum Berberidis, U. S.—Dose: 2 Cc., or 30 minims.	

- BETANAPHTHOL.**—(Naphtol '90).—Monatomic phenol, occurring in coal-tar, or prepared from Napthalene..... 112
 Pale, buff-colored scales, or yellowish-white crystalline powder; soluble in 950 parts water, readily in alcohol, ether, chloroform and alkalies.
 Dose: 0.250 Gm., or 4 grains (in capsule).
 Liquor Zinci et Alumini Compositus, N. F.
 Liquor Zinci et Ferri Compositus, N. F.
- BISMUTH CITRAS.**—Representing about 60 per cent. Bismuth Oxide.
- BISMUTHI ET AMMONII CITRAS.**—Ammonio-Citrate of Bismuth.
 Pearly scales, very soluble in water, insoluble in alcohol.
 Dose: 0.125 Gm., or 2 grains.
 Liquor Bismuthi, N. F.—Dose: 4 Cc., or 1 fluidram.
- Bismuthi Oxidum Hydratum, N. F.**—Hydrated Oxide of Bismuth.—for preparing Cremor Bismuthi, by triturating 20 Gm. of this powder with 80 Cc. of water.
 Uses: Similar to the subnitrate.
- BISMUTH SUBCARONAS.**—Representing about 90 per cent. Bismuth Oxide.
 White powder, insoluble in neutral solvents.
 Uses: Practically identical with the subnitrate.
 The insoluble compounds of bismuth should be administered either in liquid mixtures, ordered to be "well shaken," or dry: powders, capsules or cachets. They should never be massed or formed into pills, as they are liable to form hard, insoluble masses.
 Dose: 0.5 Gm., or 7½ grains.
- BISMUTHI SUBGALLAS.**—Similar to "Dermatol."
 Bright yellow powder, insoluble in neutral solvents.
 Dose: 0.25 Gm., or 4 grains, in capsule or cachet.
- BISMUTHI SUBNITRAS.**—Representing about 80 per cent. Bismuth Oxide.
 White powder, practically insoluble in neutral solvents.
 Dose: 0.5 Gm., or 7½ grains.
- BISMUTHI SUBSALICYLAS.**—Representing about 62 per cent. Bismuth Oxide.
 Whitish powder, practically insoluble in neutral solvents.
 Dose: 0.25 Gm., or 4 grains, in capsule or cachet.
- BLOOD SERUM**.....114, 178
- Boroglycerinum, N. F.**—Glyceryl Borate, Boroglyceride.—By reaction of Boric Acid and Glycerine.
 Semi-solid, translucent mass, soluble in water and glycerine.
 See Glyceritum Boroglycerini, U. S.
- BROMIDES**.....93, 150
- BROMOFORMUM.**—Bromoform.
 Heavy liquid, s. g., 2.808, resembling chloroform, very slightly soluble in water, but soluble in all proportions in alcohol, ether, fixed and volatile oils and in 80 parts glycerine.
 Dose: 0.2 Cc., or 3 minims.
- BROMUM.**—Bromine.—Br.
 Heavy, dark, brownish-red liquid, s. g., 3.0, evolving irritating suffocating fumes.
 Liquor Bromi, N. F.—(Smith's Solution of Bromine).

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- BUCHU.**—Leaves of *Barosma betulina*. 142
 Dose: 2 Gm., or 30 grains.
Fluidextractum Buchu, U. S.—Dose: 2 Cc., or 30 minims.
Elixir Buchu; *Elixir Buchu Comp.*; *Elixir Buchu et Potassii Acetatis*, N. F.
- CAFFEINA.**—Thein.—Alkaloid from *Thea sinensis*, or *Coffea arabica*. 66, 138
 White silky needles in fleecy masses, soluble in 45.6 parts water, in 53.2 parts alcohol, in 375 parts ether and in 8 parts chloroform; its solubility is increased by bromides, benzoates and salicylates of the alkalies.
 Dose: 0.065 Gm., or 1 grain, in powder, capsule.
Caffeinæ Sodio-Benzoeas, N. F.
Caffeinæ Sodio-Salicylas, N. F.
Elixir Caffeinæ, N. F.
- CAFFEINA CITRATA.**—Citrated Caffeine.
 Mixture of equal parts Caffeine and Citric Acid, soluble in about 25 parts water.
 Dose: 0.125 Gm., or 2 grains.
- CAFFEINA CITRATA EFFERVESCENS.**—Effervescent granular salt, containing about 4 per cent. Caffeine.
 Dose: 4 Gm., or 60 grains (containing about 2 gra. Caffeine).
Pulvis Potassii Bromidi Effervescens cum Caffeina, N. F.
- Caffeinæ Sodio-Benzoeas**, N. F.—Caffeine Sodio-Benzoate.
 Powder consisting of equal parts of Caffeine and Sodium Benzoate; soluble in water, 2 parts.
 Dose: 0.2 Gm., or 3 grains; in powder, capsules or in effervescent combination. It may be given hypodermically in a dose of two to five grains.
- Caffeinæ Sodio-Salicylas**, N. F.—Caffeine and Sodium Salicylate, each equal parts.
 Dose: 0.2 Gm., or 3 grains.
- CALAMINE.**—A mixture of native carbonate and salicylate of zinc. Used as a sedative and antiseptic. 202
- CALAMUS.**—Unpeeled rhizome *Acorus Calamus*
 Uses: Aromatic, stomachic.
 Dose: 1 Gm., or 15 grains.
Fluidextractum Calami, U. S.—Dose: 1. Cc., or 15 minims.
- CALCII BROMIDUM.**—Calcium Bromide.
 White, granular salt, deliquescent, soluble in 0.5 part water and in 1 part alcohol.
 Dose: 1 Gm., or 15 grains.
Elixir Calcii Bromidi, N. F.
- CALCII CARBONAS PRÆCIPITATUS.**—Precipitated Calcium Carbonate.
 Fine white powder, practically insoluble in water.
 Dose: 1 Gm., or 15 grains.
Unguentum Sulphuris Compositum, N. F.
- CALCII CHLORIDUM.**—Calcium Chloride, rendered anhydrous by fusing. 114
- CALCII HYPOPHOSPHIS.**—Calcium Hypophosphite.
 Pearl-colored scales, or white granules, soluble in 6.5 parts water, insoluble in alcohol.
 Dose: 0.5 Gm., or 7½ grains.
Syrupus Hypophosphitum, U. S.—Dose: 8 Cc., or 2 fluidrams.

- Syrupus Hypophosphitum Compositus**, U. S.—Dose: 8 Cc., or 2 fluidrams.
- Emulsion Olei Morrhue cum Hypophosphitibus**, U. S.—Dose: 8 Cc., or 2 fluidrams.
- Elixir Calcii Hypophosphitis**, N. F.
- Liquor Hypophosphitum**, N. F.
- Liquor Hypophosphitum Comp.**, N. F.
- Syrupus Calcii Hypophosphitis**, N. F.
- Syrupus Calcii et Sodii Hypophosphitum**, N. F.
- CALCII PHOSPHAS PRÆCIPITATUS**.—Precipitated Calcium Phosphate.
- Syrupus Calcii Chlorhydrophosphatis**, N. F.
- Emulsum Olei Morrhue cum Calcii Phosphate**, N. F.
- CALCII SULPHAS EXSICCATUS**.—Dried Gypsum or Plaster Paris. Fine white powder, forming with an equal weight of water a smooth paste which rapidly hardens.
- CALENDULA**.—Florets of *Calendula officinalis*.
Tinctura Calendulæ, U. S.—(externally).
- CALOMEL**. 139
- CALUMBA**.—Root of *Jateorrhiza palmata*. 119
Dose: 2 Gm., or 30 grains.
Tinctura Calumbæ, U. S.—Dose: 4 Cc., or 1 fluidram.
Fluidextractum Calumbæ, U. S.—Dose: 2 Cc., or 30 minims.
- CALX**.—Lime—Calcium Oxide—CaO.—Prepared by calcination; when anhydrous should contain not less than 90 per cent. Calcium Oxide.
Hard, white masses from which the air should be excluded; with water “slakes” or forms Calcium Hydroxide; soluble in 760 parts water, much less soluble in boiling water (1,600).
Liquor Calcis, U. S.—Dose: 16 Cc., or 4 fluidrams.
Syrupus Calcis, U. S.—Dose: 2 Cc., or 30 minims.
- CALX CHLORINATA** (Calx Chlorata '90).—Chlorinated Lime.—“Chloride” of Lime. Containing not less than 30 per cent. available Chlorine. 203
Liquor Sodæ Chlorinata, U. S.
Liquor Potassæ Chlorinata, N. F.
- CALX SULPHURATA**.—Sulphurated Lime, improperly called “Calcium Sulphide.”—Mixture of 60 per cent. Calcium Sulphide with Calcium Sulphate and Carbon.
Grayish-white powder, decomposing by liberation of Hydrogen Sulphide when exposed to moist air; slightly soluble in cold water, readily in boiling water, which decomposes it.
Dose: 0.065 Gm., or 1 grain; in powder or capsule; should not be massed or formed in pills.
Liquor Calcis Sulphuratæ, N. F.
- CAMBOGIA**.—Gamboge.—Gum resin from *Garcinia Hanburii*. 134
Dose: 0.125 Gm., or 2 grains.
Pilulæ Catharticæ Compositæ, U. S.
- Camphor-Menthol**, N. F.—Camphor and Menthol.—Solution produced by liquefaction of equal parts of Camphor and Menthol. Solution from 1 to 4 per cent. in Liquid Petrolatum, as a spray in rhinitis, pharyngitis, etc.
- CAMPHORA**.—Camphor.—Ketone from *Cinnamomum Camphora*. 85
White masses of crystalline structure, very sparingly soluble in water, readily in alcohol, ether, chloroform, fixed and volatile oils. Triturated in about molecular proportions with Menthol, Thymol, Phenol or Hydrated Chloral, liquefaction ensues.

Dose: 0.125 Gm., or 2 grains.

Aqua Camphoræ, U. S.—Dose: 8 Cc., or 2 fluidrams.

Spiritus Camphoræ, U. S.—Dose: 1 Cc., or 16 minims.

Tinctura Opii Camphorata, U. S.—Dose: 8 Cc., or 2 fluidrams.

Linimentum Camphoræ, U. S.

Linimentum Saponis, U. S.

Ceratum Camphoræ, U. S.

Mistura Camphoræ Acida, N. F.

Mistura Camphoræ Aromatica, N. F.

Camphor-Menthol, N. F.

Chloral Camphoratum, N. F.

Ceratum Camphoræ Compositum, N. F.

Pilulæ Opii et Camphoræ, N. F.

Emplastrum Fuscum Camphoratum, N. F.

Linimentum Saponato-Camphoratum, N. F.

Unguentum Camphoræ, N. F.

CAMPORA MONOBROMATA.—Monobromated Camphor.—Substitution product of Camphor.

Prismatic needles or scales, almost insoluble in water, readily soluble in other solvents.

Dose: 0.125 Gm., or 2 grains; in powder, capsule or pill form.

CANNABIS INDICA.—Flowering tops of *Cannabis sativa*. 95

Dose: 0.065 Gm., or 1 grain.

Fluidextractum Cannabis Indicæ, U. S.—Dose: 0.06 Cc., or 1 minim.

Tinctura Cannabis Indicæ, U. S.—Dose: 0.6 Cc., or 10 minims.

Extractum Cannabis Indicæ, U. S.—Dose: 0.01 Gm., equals 10 mg. or 1/5 grain.

Mistura Chloroformi et Cannabis Indicæ Composita, N. F.

CANTHARIS.—The Beetle, *Cantharis vesicatoria*.—*Cantharidis Pulvis*. 142, 194

Grayish-brown with shining green particles with a few hairs.

Dose: 0.03 Gm., or ½ grain (caution).

Tinctura Cantharidis, U. S.—(10 per cent.). Dose: 0.3 Cc., or 5 minims.

Ceratum Cantharidis, U. S.—(32 per cent.).

Collodium Cantharidatum, U. S.—(60 per cent.).

CAPSICUM.—Fruit *Capsicum fastigiatum*. 120

Dose: 0.065 Gm., or 1 grain.

Tinctura Capsici, U. S.—(10 per cent.). Dose: 0.5 Cc., or 8 minims

Fluidextractum Capsici, U. S.—Dose: 0.05 Cc., or 1 minim.

Oleoresina Capsici, U. S.—Dose: 0.030 Gm., equals 30 mg., or ½ grain.

Emplastrum Capsici, U. S.

Tinctura Capsici et Myrrhæ, N. F.

CARBO ANIMALIS.—Animal Charcoal.—("Bone black.") 117

CARBO ANIMALIS PURIFICATUS.

CARBO LIGNI.—Charcoal.—(Wood).

Dose: 1 Gm., or 15 grains.

CARBONEI DISULPHIDUM.—Bisulphide of Carbon.—CS₂

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CARDAMOMUM. —Fruit of <i>Elettaria repens</i>	120
Dose: 1 Gm., or 15 grains.	
Tinctura Cardamomi, U. S.	
Tinctura Cardamomi Composita, U. S.—Dose: 4 Cc., or 1 fluidram.	
Pulvis Aromaticus, U. S.—Dose: 1 Gm., or 15 grains.	
CARUM. —Fruit of <i>Carum Carvi</i> .	
CARYOPHYLLUS. —Cloves.—Flower buds of <i>Eugenia aromatica</i> ..	120
CASSIA FISTULA. —Fruit of <i>Cassia fistula</i> .	
CASTOR OIL	126
CATAPLASMA KAOLINI. —Cataplasm of Kaolin.—“Antiseptic Clay Paste. Similar in composition to certain proprietary articles sold under fancy names such as Antiphlogistine, Anhydrosine, Thermofuge, Thermaline, Unguentum Terralis, etc. Mixture of elutriated anhydrous Kaolin 57.7 parts, levigated with Glycerine 37.5 parts, and containing 4.5 parts Boric Acid, 2 parts Methyl Salicylate and one-half part each Thymol and Oil of Peppermint.....	197
CERA ALBA. —White Wax.	
CERA FLAVA. —Yellow Wax.	

CERATA—CERATES.

Mixtures of fats and waxes with medicinal agents, softening and adhering to the skin, to which they may be applied by spreading the Cerate on cloth or paper.

CERATUM. —Cerate (Simple Cerate).—Mixture of white wax, 30; white petrolatum, 20; benzoinated lard, 50 parts.	
CERATUM RESINÆ. —Rosin Cerate (Basilicon Ointment).—Mixture of lard, 50; yellow wax, 15, and rosin, 35 parts.	
Uses: To reduce inflammation.	
CERATUM RESINÆ COMPOSITUM. —Deshler's Salve.—Rosin cerate, with 11.5 turpentine (pitch), and 13.5 linseed oil.	
Uses: To reduce inflammation.	
CERII OXALAS. —Cerium Oxalate.—Mixture of cerium, didymium and lanthanum oxalates.....	148
White powder, insoluble in water or other neutral solvents.	
Dose: 0.065 Gm., or 1 grain; in powder or capsule.	
CETACEUM. —Spermaceti.—Fat from <i>Physeter macrocephalus</i> .	
CHARCOAL	117
CHARTA SINAPIS. —Mustard Paper.—Paper coated with oil-free black mustard; 60 square cm. containing about 4 Gm. (60 grains).	
CHENOPODIUM	118
CHERRY LAUREL. —Incompatible with Morphine. When mixed they may form the poisonous cyanide of morphine.....	32
CHIMAPHILA. —Leaves of <i>Chimaphila umbellata</i> .	
Uses: Diuretic, alterative.	
Dose: 2 Gm., or 30 grains.	
Fluidextractum Chimaphilæ, U. S.—Dose: 2 Cc., or 30 minims.	
Fluidextractum and Syrupus <i>Stillingiæ Compositus</i> , N. F.	

CHIRATA.—Plant of *Swertia Chirayita*.

Dose: 1 Gm., or 15 grains.

Fluidextractum Chiratæ, U. S.—Dose: 1 Cc., or 15 minims.

Chloral-Camphoratum, N. F.—Chloral et Camphora.—Solution produced by liquefaction of equal parts of hydrated Chloral and Camphor.**CHLORALFORMAMIDUM.**—Compound of Chloral and Formamide.—“Chloralamide”..... 47

Crystals, soluble in 18.7 parts water, in 1.3 parts alcohol, readily in ether, acetone, glycerine.

Dose: 1 Gm., or 15 grains; in capsule.

CHLORALUM HYDRATUM.—Hydrated Chloral (Chloral '90).—Trichloraldehyde or Chloral, with the element of one molecule of water..... 45

Translucent crystals, freely soluble in water, alcohol, ether, chloroform, fixed and volatile oils; it liquifies when triturated with about equal quantities of camphor, menthol, thymol or phenol.

Incompatible: With alkalies, compounds of mercury, iodine and lead.

Dose: 1 Gm., or 15 grains.

Mistura Chlorali et Potassii Bromidi Composita, N. F.

Chloral Camphoratum, N. F.

CHLORALOSE..... 47**CHLORETONE**..... 47, 237**CHLOROFORMUM.**—Chloroform, containing from 0.6 to 1 per cent. alcohol..... 38Heavy, colorless liquid, *s. g.*, 1.476, soluble in about 200 times its volume of water, in all proportions in alcohol, ether, benzene, petroleum-benzin, fixed and volatile oils.

Dose: 0.3 Cc., or 5 minims.

Aqua Chloroformi, U. S.—Dose: 16 Cc., or 4 fluidrams.

Spiritus Chloroformi, U. S.—Dose: 2 Cc., or 30 minims.

Linimentum Chloroformi, U. S.—30 per cent.

Mistura Chloroformi et Cannabis Indicæ Composita, N. F.

Elixir Chloroformi Compositus, N. F.

CHONDRUS.—Plant *Chondrus crispus*..... 199

Mucilago Chondri, N. F.

CHROMII TRIOXIDUM.—(Acidum Chromicum '90).

Garnet-red crystals or prisms, very soluble in water.

Caution.—In contact with alcohol, ether, glycerine or other organic solvents, reacts with explosive violence.

CHRYSAROBINUM.—(Erroneously called Chrysophanic Acid).—Neutral principle from Goa powder of *Vouacoupoua Araroba*.. 201

Orange-yellow crystalline powder, sparingly soluble in water, alcohol, ether; in 18 parts chloroform.

Dose: 0.03 Gm., or ½ grain.

Unguentum Chrysarobini, U. S.—(5 per cent.).

CIMICIFUGA.—Rhizome *Cimicifuga racemosa*..... 97

Uses: Alterative, emmenagogue, sedative; in chorea, etc.

Dose: 1 Gm., or 15 grains.

Tinctura Cimicifugæ, U. S.—Dose: 4 Cc., or 1 fluidram.

Fluidextractum Cimicifugæ, U. S.—Dose: 1 Cc., or 15 minims.

Extractum Cimicifugæ, U. S.—Dose: 0.25 Gm., or 4 grains.

Syrupus Actææ Compositus, N. F.

- CINCHONA.**—Bark of *Cinchona Ledgeriana*, *C. Calisaya* and *C. officinalis*; should yield at least 4 per cent. anhydrous ether-soluble alkaloids.
 Dose: 1 Gm., or 15 grains.
Tinctura Cinchonæ, U. S.—Dose: 4 Cc., or 1 fluidram.
Fluidextractum Cinchonæ, U. S.—Dose: 1 Cc., or 15 minims.
Elixir Cinchonæ (*Calisaya*), N. F.
Elixir Cinchonæ et Hypophosphitum, N. F.
Elixir Cinchonæ et Ferri, N. F.
Elixir Cinchonæ, Ferri Bismuthi et Strychninæ, N. F.
Elixir Cinchonæ, Ferri et Bismuthi, N. F.
Elixir Cinchonæ, Ferri et Calcii Lactophosphatis, N. F.
Elixir Cinchonæ, Ferri et Pepsini, N. F.
Elixir Cinchonæ, Ferri et Strychninæ, N. F.
Elixir Cinchonæ, Pepsini et Strychninæ, N. F.
Tinctura Cinchonæ Detannata, N. F.
Vinum Carnis, Ferri et Cinchonæ, N. F.
- CINCHONA RUBRA.**—Bark of *Cinchona succirubra*.—Should yield not less than 5 per cent. anhydrous cinchona alkaloids.
 Dose: 1 Gm., or 15 grains.
Tinctura Cinchonæ Composita, U. S.—Dose: 4 Cc., or 1 fluidram.
- CINCHONIDINÆ SULPHAS.**—Cinchonidine Sulphate.—Neutral sulphate of an alkaloid from *Cinchona*.
 White, silky needles, soluble in 68 parts water, in 72 parts alcohol, practically insoluble in ether and chloroform.
 Dose: 0.25 Gm., or 4 grains.
- CINCHONINÆ SULPHAS.**—Cinchonine Sulphate.—Neutral sulphate of an alkaloid from *Cinchona*.
 White, hard crystals, soluble in 58 parts water, in 10 parts alcohol, in 69 chloroform, insoluble in ether.
 Dose: 0.25 Gm., or 4 grains.
- CINNALDEHYDUM.**—Cinnamic Aldehyde.—Aldehyde obtained from Oil of Cinnamon, or prepared synthetically; see volatile oils.
- CINNAMOMUM SAIGONICUM.**—Bark of undetermined species of *Cinnamon*. 120
 Dose: 0.25 Gm., or 4 grains.
Tinctura Cinnamomi, U. S.—Dose: 2 Cc., or 30 minims.
- CINNAMOMUM ZEYLANICUM.**—Ceylon Cinnamon.—Inner shoots of *Cinnamomum Zeylanicum*.
- COCA.**—Leaves *Erythroxylon Coca*.—0.5 per cent. alkaloids.
 Dose: 2 Gm., or 30 grains.
Fluidextractum Cocæ, U. S.—Dose: 2 Cc., or 30 minims.
Vinum Cocæ, U. S.—Dose: 16 Cc., or 4 fluidrams.
Elixir Cocæ, N. F.
Elixir Cocæ et Guaranæ, N. F.
Vinum Cocæ Aromaticum, N. F.
- COCAINA.**—Cocaine.—Alkaloid from *Coca*. 40
 Large colorless prisms, soluble in 600 parts water, in 5 parts alcohol, in 3.8 parts ether; very soluble in chloroform, in 12 parts olive oil and in 14 parts oil turpentine, insoluble in glycerine.
 Dose: 0.030 Gm., or $\frac{1}{2}$ grain.
Oleatum Cocainæ, U. S.—(5 per cent.).
Stilus Cocainæ Dilubilis (5 per cent.), N. F.

	Page
COCAINÆ HYDROCHLORIDUM. —Cocaine Hydrochlorate ('90). Colorless prisms, lustrous leaflets or crystalline powder; soluble in 0.4 parts water, 2.6 parts alcohol, in 18.5 parts chloroform; insoluble in ether. Incompatible: with silver nitrate, mercurials and alkaloidal reagents. Dose: 0.030 Gm., or ½ grain.	
COCCUS. —Cochineal.—Insect, <i>Pseudococcus cacti</i>	200
CODEINA. —Alkaloid from Opium, or prepared from Morphine... White prisms or crystalline powder, soluble in 88 parts water, 1.6 parts alcohol, 12.5 parts ether and 0.66 parts chloroform. Will mix with sodium bromide in watery solution. Dose: 0.030 Gm., or ½ grain. Syrupus Codeinæ, N. F. Elixir Terpini Hydratis cum Codeina, N. F.	150
CODEINÆ PHOSPHAS. —Codeine Phosphate. Needle-shaped crystals, or crystalline powder, soluble in about 3 parts water, practically insoluble in alcohol, ether and chloroform. Dose: 0.030 Gm., or ½ grain.	
CODEINÆ SULPHAS. —Codeine Sulphate. Long needle-shaped crystals or crystalline powder, soluble in about 30 parts water, practically insoluble in alcohol, ether and chloroform. Will not mix with sodium bromide in watery solution. Dose: 0.030 Gm., or ½ grain.	
COD LIVER OIL	173
COLCHICI CORMUS. —Colchici Radix ('90).—Corm of <i>Colchicum autumnale</i> .—0.35 per cent. Colchicine..... Dose: 0.25 Gm., or 4 grains. Extractum Colchici Cormi, U. S.—Dose: 0.065 Gm., or 1 grain. Vinum Colchici Radicis, U. S. '90.—40 per cent.	174
COLCHICI SEMEN. —Seed of <i>Colchicum autumnale</i> .—0.45 per cent. Colchicine. Dose: 0.2 Gm., or 3 grains. Tinctura Colchici Seminis, U. S.—Dose: 2 Cc., or 30 minims. Vinum Colchici Seminis, U. S.—(10 per cent.).—Dose: 2 Cc., or 30 minims. Fluidextractum Colchici Seminis, U. S.—Dose: 0.2 Cc., or 3 minims.	
COLCHICINA. —Alkaloid from <i>Colchicum</i> . Pale-yellow leaflets, or powder, turning darker on exposure, soluble in 22 parts water, 155 parts ether, very soluble in alcohol and chloroform. Dose: 0.0005 Gm., equal to 0.5 mg., or 1/128 grain, in powder or pill form.	
COLLODIA—COLLODIONS. Solutions in ether-alcohol of pyroxylin, or soluble gun-cotton, with medicinal agents; for external application.	
COLLODIUM. —Solution in Alcohol 25, Ether 75, of Pyroxylin 4 parts.....	200
COLLODIUM CANTHARIDATUM. —Blistering Collodion.—Flexible Collodion representing 60 per cent. Cantharides.	
COLLODIUM FLEXILE. —Flexible Collodion.—Collodion containing Canada Turpentine 5, Castor Oil 3, parts in 100.....	200
Collodium Iodatum, N. F. —Iodized Collodium.—Five per cent. Iodine in flexible collodion.	

- Collodium Iodoformatum**, N. F.—Iodoform Collodion.—5 per cent. Iodoform in Flexible Collodion.
Uses: Locally to produce the antiseptic and other effects of Iodoform.
- Collodium Salicylatum Compositum**, N. F.—Corn Collodion.—Salicylic Acid, 11; Ext. Cannabis Ind., 2, in Flexible Collodion, to 100 parts.
- COLLODIUM STYPTICUM**.—Styptic Collodion.—Collodion containing 20 per cent. Tannic Acid.
- Collodium Tiglli**, N. F.—Croton Oil Collodion.—10 per cent. Croton Oil with Flexible Collodion.
Uses: Locally to produce the counterirritant and vesicating effects of Croton Oil.
- COLOCYNTHIS**.—Peeled fruit *Citrullus Colocynthis*. 134
Dose: 0.065 Gm., or 1 grain.
Extractum Colocynthis, U. S.—**Dose:** 0.03 Gm., or $\frac{1}{2}$ grain.
Extractum Colocynthis Compositum, U. S.—**Dose:** 0.5 Gm., or $7\frac{1}{2}$ grains.
Pilulæ Catharticæ, U. S.
Pilulæ Catharticæ Vegetabiles, U. S.
Pilulæ Colocynthis Compositæ, N. F.
Pilulæ Colocynthis et Hyoscyami, N. F.
Pilulæ Colocynthis et Podophylli, N. F.
Pilulæ Laxativæ Post Partum, N. F.
- CONFECTIONES—CONFECTIONS (Linctus).**
 Flavored medicated masses of sugar.
- CONFECTIO ROSÆ**.—Containing Red Rose 8 per cent.
- CONFECTIO SENNÆ**.—Electuari Sennæ.—Mixture of the pulps of Cassia Fistula, Prune, Tamarind and Fig, with 10 per cent. Senna, flavored with Oil of Coriander.
Dose: 4 Gm., or 60 grains.
- CONIUM**.—Fruit of *Conium maculatum*.—0.5 per cent. Coniine... 152
Dose: 0.20 Gm., or 3 grains.
Tinctura Conii (15 per cent.), U. S. '90.
Fluidextractum Conii, U. S.—**Dose:** 0.2 Cc., or 3 minims.
Extractum Conni, U. S. '90.—(Usually inert).
Coniine Hydrobromide.—**Dose** $\frac{1}{60}$ of a grain.
- CONVALLARIA**.—Rhizome *Convallaria majalis*.
Uses: Cardiac, tonic, diuretic.
Dose: 0.50 Gm., or $7\frac{1}{2}$ grains.
Fluidextractum Convallariæ, U. S.—**Dose:** 0.5 Cc., or 8 minims.
- COPAIBA**.—Oleoresin from various species of *Copaiba*. 142, 154
 Brownish-yellow, thick, liquid, s. g. 0.95 to 0.99, insoluble in water, practically soluble in other neutral solvents.
Dose: 1 Cc., or 15 minims.
Massa Copaibæ, U. S. '90, "Solidified Copaiba,"
 or:
Pil Copaibæ et Magnesiæ, for pill form.
Mistura Copaibæ, N. F.
- Cordiale Rubi Fructus**, N. F.—Blackberry Cordial.—Cordial consisting of about equal parts of blackberry juice, syrup and diluted alcohol, with cinnamon, cloves and nutmeg.
Dose: 30 Cc., or 1 fluid ounce.

- CORIANDRUM.**—Fruit of *Coriandrum sativum*.
Uses: Aromatic, corrective, adjuvant.
Dose: 0.5 Gm., or 7½ grains.
- CREOSOTAL**..... 155
- CREOSOTUM.**—Mixture of Phenols and derivatives, Guaiacol and Creosol, obtained by distillation from tar, preferably that from the beech (Beech-wood Creosote)..... 115, 154
 Yellowish liquid, s. g. 1.073, soluble in 140 parts water with cloudiness, freely soluble in alcohol, ether, chloroform, fixed and volatile oils, but not soluble in glycerine.
Caution.—Against substitution of the so-called coal-tar creosote (carbolic acid).
Dose: 0.2 Cc., or 3 minims.
 Aqua Creosoti, U. S.—**Dose:** 8 Cc., or 2 fluidrams.
 Unguentum Creosoti Salicylatum Extensum, N. F.
- CRESOL.**—Cresylic Acid—("Tricresol").—Mixture of three isomeric cresols obtained from coal-tar, freed from phenol, etc.
 Colorless or straw-colored liquid, s. g. 1.032, soluble in 60 parts water, miscible in all proportions with alcohol, ether, glycerine, petroleum-benzin, benzene and alkali hydroxide solutions.
Dose: 0.05 Cc., or 1 minim, rarely.
 Liquor Cresolis Compositus, U. S.—50 per cent.
 Tinctura Cresolis Saponata, N. F.
- CRETA PREPARATA.**—Prepared Chalk.
 Grayish-white, very fine, amorphous powder, usually molded into cones or "drops;" insoluble in neutral liquids.
Dose: 1 Gm., or 15 grains.
 Mistura Cretæ, U. S.—**Dose:** 16 Cc., or 4 fluidrams.
- CROCUS**..... 200
- CROTON CHLORAL HYDRATE**..... 48
- CUBEBA.**—Fruit Piper Cubeba..... 142, 154
Dose: 1 Gm., or 15 grains.
 Fluidextractum Cubebæ, U. S.—**Dose:** 1 Cc., or 15 minims.
 Oleoresina Cubebæ, U. S.—**Dose:** 0.5 Gm., or 7½ grains.
 Trochisci Cubebæ, U. S.
- CUPRI SULPHAS.**—Copper Sulphate.—(Blue Vitriol)..... 112
 Large, deep-blue crystals, soluble in 2.2 parts water, 3.5 parts glycerine, practically insoluble in alcohol.
Dose: Astringent, 0.01 Gm. (1/5 gr.); emetic, 0.25 Gm., or 4 grains.
- CUSSO.**—Kousso—(Brayera '80).—Flowers of *Hagenia abyssinica*.
Uses: Anthelmintic, tænicide.
Dose: 16 Gm., or 240 grains.
 Fluidextractum Cusso, N. F.
- CYPRIPEDIUM.**—Rhizome of *C. hirsutum* and *C. parviflorum*.
Uses: Antispasmodic, nerve stimulant.
Dose: 1 Gm., or 15 grains.
 Fluidextractum Cypripedii, U. S.—**Dose:** 1 Cc., or 15 minims.
- DATURINE** (see Stramonium).—Practically identical with atropine, but is rarely used in medicine..... 153
Dose: 1/200 of a grain.

DECOCTA—DECOCTIONS.

Liquid extracts prepared by extracting drugs by boiling with water.

Caution.—The strength of decoctions of potent drugs should be specified by the prescriber.

Decoctum Aloes Compositum, N. F.

Dose: 30 Cc., or 1 fluid ounce, containing extract of aloes, 0.3 (5 grs.); myrrh and saffron, each 0.15 (3 grs.); potass. carb, 0.1 (1½ gr.); extract of glycyrrhiza, comp. tr. cardamom and water.

Uses: Stimulant, cathartic and emmenagogue.

DIASTASE..... 124

DIETHYLMALONYLURIA.—See Veronal.

DIGITALIS.—Leaves of *Digitalis purpurea*.....81, 239

Dose: 0.065 Gm., or 1 grain.

Infusum Digitalis, U. S.—Dose: 8 Cc., or 2 fluidrams.

Tinctura Digitalis, U. S.—Dose: 1 Cc., or 15 minims.

Fluidextractum Digitalis, U. S.—Dose: 0.05 Cc., or 1 minim.

Extractum Digitalis, U. S.—Dose: 0.010 Gm., equal to 10 mg., or 1/5 grain.

DIURETIN..... 138

ELASTICA.—Para Rubber.

ELATERINUM.—Elaterin.—Neutral principle obtained from *Elaterium*, a substance deposited by the juice of the fruit of *Echallium Elaterium* (the so-called Clutterbuck's *Elaterium*).....133, 137

Minute scales, or prismatic crystals, insoluble in water, sparingly soluble in alcohol, ether.

Dose: 0.005 Gm., equals 5 mg., or 1/10 grain.

Trituratio Elaterini, U. S.—Dose: 0.03 Gm., or ½ grain.

ELIXIRIA—ELIXIRS.

Sweetened alcoholic, agreeably flavored liquids, which may be simply aromatic or adjuvant, to serve as vehicles to disguise the taste of bitter or nauseous drugs; or they may contain medicinal agents. Elixir of any drug may be prepared extemporaneously from the fluid extract, e. g. *Elixir Calumbæ*:

R. *Elix. calumbæ*..... §i 25]
Elix. adjuvantis..... §iii 75]

M. Sig.: Dose: One teaspoonful.

The elixirs present one of the most agreeable and promptly acting forms of medication, which contain about 25 per cent. alcohol by volume, and, with a few exceptions, viz., *Elixir Terpini Hydratis*, etc., should be employed with discrimination.

Elixir Acidi Salicylici, N. F.

Dose: 4 Cc., or 1 fluidram; representing 0.3 Gm. (5 gr.) salicylic acid.

ELIXIR ADJUVANS.—Adjuant Elixir.—Aromatic Elixir, containing 12 per cent. Glycyrrhiza..... 198

Uses: Especially valuable to mask the taste of quinine.

Caution.—Since the active principle of the Licorice (Glycyrrhizin) is precipitated by acids, the quinine should not be dissolved by the aid of dilute acid, but simply be suspended in the elixir as a "shake well" mixture.

Elixir Ammonii Bromidi, N. F.

Dose: 4 Cc., or 1 fluidram, representing 0.3 Gm. (5 gr.) ammonium bromide.

Elixir Ammonii Valerianatis, N. F.—Elixir of Ammonium Valerianate.

Dose: 4 Cc., or 1 fluidram; representing 0.12 Gm. (2 gr.) ammonium valerianate in red elixir.

Elixir Ammonii Valerianatis et Quininae, N. F.

Dose: 4 Cc., or 1 fluidram, representing 0.015 Gm. ($\frac{1}{4}$ gr.) quinine hydrochloride, and 0.12 Gm. (2 grs.) ammonium valerianate.

Elixir Anisi, N. F.

Dose: Infants, 1 Cc., or 15 minims; containing anethol, oil fennel and bitter almond.

Elixir Apii Graveolentis Compositum, N. F.

Dose: 4 Cc., or 1 fluidram, containing 0.3 Gm. (5 gr.) each of celery seed, coca, kola, and viburnum prunifolium. Similar in composition to a well-known trade article.

Caution.—To avoid confusion with "Opil" the title Apii Graveolentis should be written out in full.

ELIXIR AROMATICUM.—Simple Elixir.—A cordial flavored with orange, lemon and coriander..... 199

ELIXIR FERRI, QUININÆ ET STRYCHNINÆ PHOSPHATUM.

Dose: 4 Cc., or 1 fluidram, representing about 0.06 Gm. (1 gr.) ferric phosphate, 0.03 Gm. ($\frac{1}{2}$ gr.) quinine and 0.001 Gm. (1/60 gr.) strychnine.

Dose: 4 Cc., or 1 fluidram, representing 1 Gm. (15 grs.) frangula.

Elixir Gentianæ, N. F.

Uses: Bitter tonic.

Dose: 4 Cc., or 1 fluidram, representing 0.12 Gm. (2 grs.) gentian.

Elixir Gentianæ Glycerinatum, N. F.

Uses: Bitter tonic, stomachic.

Dose: 8 Cc., or 2 fluidrams, representing gentian, taraxacum, phosphoric acid, in glycerine and white wine, flavored with sweet orange peel, compound tincture cardamom and acetic ether. Similar in composition to a trade-article becoming known to the public as a "glycerine tonic."

Elixir Hypophosphitum, N. F.

Dose: 8 Cc., or 2 fluidrams representing 0.4 Gm. (6 grs.) calcium hypophosphite and 0.12 Gm. (2 grs.) each sodium and potassium hypophosphites.

Elixir Hypophosphitum cum Ferro, N. F.

Uses: Alternative, constructive, hematonic.

Dose: 8 Cc., or 2 fluidrams, representing 0.06 Gm. (1 gr.) each potassium and ferrous hypophosphites, and 0.12 Gm. (2 grs.) each calcium and sodium hypophosphites.

Elixir Malti et Ferri, N. F.

Dose: 16 Cc., or 4 fluidrams, representing 0.25 Gm. (4 grs.) soluble ferric phosphate and 4 Cc. (60 minims) extract of malt.

Elixir Paraldehydi, N. F.

Dose: 8 Cc., or 2 fluidrams, representing 2 Cc. (30 minims) paraldehyde.

Elixir Pepsini, N. F.

Dose: 16 Cc., or 4 fluidrams, representing 0.25 Gm. (4 grs.) pepsin and glycerine, hydrochloric acid and aromatic elixir.

Elixir Pepsini et Bismuthi, N. F.

Dose: 8 Cc., or 2 fluidrams, representing 0.12 Gm. (2 grs.) pepsin, 0.25 Gm. (4 grs.) bismuth and sodium tartrate

Elixir Pepsini, Bismuthi et Strychninae, N. F.

Dose: 4 Cc., or 1 fluidram, representing 0.006 Gm. (1/100 gr.) strychnine, 0.08 Gm. (½ gr.) pepsin, and 0.12 Gm. (2 grs.) bismuth and sodium tartrate.

Elixir Pepsini et Ferri, N. F.

Uses: Gastric tonic, hematinic.

Dose: 8 Cc., or 2 fluidrams, representing 0.06 Gm. (1 gr.) ferric chloride, and 0.12 Gm. (2 grs.) pepsin.

Elixir Pectis Compositum, N. F.

Uses: Expectorant, cough sedative.

Dose: 4 Cc., or 1 fluidram, representing 0.0013 Gm. (1/50 gr.) morphine sulphate, with syrup of wild cherry, syrup of tolu and wine of tar.

Elixir Pilocarpini, N. F.

Dose: 8 Cc., or 2 fluidrams, representing 0.5 Gm. (7½ grs.) pilocarpus.

Elixir Potassii Acetatis, N. F.

Dose: 16 Cc., or 4 fluidrams, representing 1.3 Gm. (20 grs.) potassium acetate.

Elixir Potassii Acetatis et Juniperi, N. F.

Dose: 16 Cc., or 4 fluidrams, representing 1.3 Gm. (20 grs.) potassium acetate and 2 Gm. (30 grs.) juniper.

Elixir Potassii Bromidi, N. F.

Dose: 8 Cc., or 2 fluidrams, representing 1.3 Gm. (20 grs.) potassium bromide.

Elixir Rhamni Purshianae, N. F.

Dose: 4 Cc., or 1 fluidram, representing 2 Gm. (30 grs.) cascara sagrada.

Elixir Rhamni Purshianae Compositum, N. F.

Dose: 4 Cc., or 1 fluidram, representing senna, juglans (butter-nut) and cascara sagrada, with aromatics.

Elixir Rhei, N. F.

Uses: Laxative, stomachic.

Dose: 8 Cc., or 2 fluidrams, representing 0.3 Gm. (5 grs.) rhubarb.

Elixir Rhei et Magnesii Acetatis, N. F.

Dose: 4 Cc., or 1 fluidram, representing 0.5 Gm. (7½ grs.) rhubarb, and 0.25 Gm. (4 grs.) magnesium acetate.

Elixir Rubi Compositum, N. F.

Dose: 16 Cc., or 4 fluidrams, representing blackberry root and juice, galls, cinnamon, cloves, mace and ginger.

Elixir Sodii Bromidi, N. F.

Dose: 8 Cc., or 2 fluidrams, representing 1.3 Gm. (20 grs.) sodium bromide.

Elixir Sodii Hypophosphitis, N. F.

Dose: 4 Cc., or 1 fluidram, representing 0.12 Gm. (2 grs.) sodium hypophosphite.

Emplastrum Aromaticum, N. F.—Spice Plaster.—Cloves, cinnamon, ginger, each 10; capsicum, camphor, each 5; cottonseed oil, 35; lead plaster to 100.

EMPLASTRUM BELLADONNÆ.—Containing 0.38 to 0.42 per cent. mydriatic alkaloids. Adhesive plaster containing 30 per cent. extract belladonna leaves.

EMPLASTRUM CAPSICI.—Oleoresin Capsicum 0.25 Gm. spread over the surface of adhesive plaster 15 cm. square (6 inches).
Uses: Rubefacient, vesicant.

Emplastrum Fuscum Camphoratum, N. F.—Emp. Matris Camphoratum, Ph. Ger.—Brown plaster made of red oxide of lead, olive oil and wax, containing 1 per cent. camphor.

EMPLASTRUM HYDRARGYRI.—Mercury 30 per cent., with lead plaster and lanolin 10 per cent.

EMPLASTRUM OPII.—Extract opium 6 per cent., with lead plaster; representing about 10 per cent. opium.

Emplastrum Picis Liquidæ Compositum, N. F.—Comp. Tar Plaster. Mixture of resin 5, tar 4 parts, and one part each powdered podophyllum, phytolacca and sanguinaria.

EMPLASTRUM PLUMBI.—Emp. Diachylon.—Lead oleate obtained through interaction of lead acetate on solution of sodium oleate (Castile soap).

EMPLASTRUM SAPONIS.—Lead plaster with 10 per cent. soap.

EMULSA—EMULSIONS.

Emulsions are liquid preparations consisting of oily, fatty, resinous, or otherwise insoluble substances suspended in watery liquids by the intervention of gum, mucilage or other viscid material called emulsifying agents. Natural emulsions comprise products of animal or vegetable origin, consisting of oily or resinous substances so combined with gum or albumin as to be readily miscible with water without separation. Milk and egg yolk are such typical emulsions, and seeds and gum resins form emulsions when triturated with water. Artificial emulsions are made by thoroughly mixing the oil with the emulsifying agent, adding a certain proportion of water and triturating the mixture in a mortar, or agitating it in a flask. Volatile oils require the addition of a fixed oil to produce a stable emulsion. Water-insoluble substances: Salicylic acid, chloroform, salol, etc., may be emulsified in the same way as oil of turpentine.

Flavoring.—Since no single or compound aromatic can be devised which would be acceptable under all circumstances as a flavoring for emulsion of cod liver oil, the selection of the most suitable aromatic must be left to the prescriber or dispenser. Among those which are found to be most serviceable are the following, the quantities given below being intended for 1,000 Cc. (or 32 fl. oz.) of finished emulsion, though in some cases a smaller or a larger quantity, in the same proportions, may be preferable:

a.	Oil of gaultheria	m. ix	4
b.	Oil of gaultheria	m. xxx	2
	Oil of sassafras	m. xxx	2
c.	Comp. spirit of orange (U. S. P.)	m. xiv	15
d.	Oil of gaultheria	m. xxx	2
	Oil of bitter almond	m. iv	0.25
	Oil of coriander	m. iv	0.25
e.	Oil of gaultheria	m. xxv	15
	Oil of sassafras	m. xiv	15
	Oil of bitter almond	m. iv	0.25
f.	Oil of gaultheria	m. xl	25
	Oil of bitter almond	m. xl	25
g.	Oil of neroli	m. xxv	15
	Oil of bitter almond	m. xiv	15
	Oil of cloves	m. iv	0.25

Preservation.—When an emulsion of cod liver oil is to be kept for some time, its deterioration may be prevented or retarded by the addition of 65 Cc. (or 2 fl. oz.) of alcohol in the place of the same quantity of water when making 1,000 Cc. (or 32 fl. oz.) of emulsion.

EMULSUM AMYGDALÆ.—Sweet almond, 6 in 100 Cc.
Dose: 120 Cc., or 4 fluid ounces.

EMULSUM ASAFŒTIDÆ.—Asafœtida, 4 in 100 Cc.
Dose: 16 Cc., or 4 fluidrams (also by rectum).

EMULSUM CHLOROFORMI.—Chloroform, 4 in 100 Cc.
Dose: 8 Cc., or 2 fluidrams.

EMULSUM OLEI MORRHUÆ.—Cod liver oil, 50 in 100 Cc. 174

EMULSUM OLEI MORRHUÆ CUM HYPOPHOSPHITIBUS.
Dose: 8 Cc., or 2 fluidrams, containing 50 per cent. cod liver oil and of hypophosphites: calcium, Gm. 0.1 (1½ grs.), and potassium and sodium, each Gm. 0.05 (¼ gr.).

Emulsum Olei Ricini.—Castor Oil Emulsion, N. F.—Contains one-third its volume of castor oil disguised by tincture of vanilla; other flavors may be used.

Dose: 48 Cc., or 1½ fl. oz. (½ fl. oz. oil).

EMULSUM OLEI TEREBINTHINÆ.—Oil of turpentine, 15 in 100 Cc. 118, 192

Dose: 4 Cc., or 1 fluidram, containing 0.6 Cc. (10 minims) oil of turpentine.

Emulsum Petrolei.—Petroleum Emulsion, N. F.—Containing 5 per cent. white petrolatum, U. S.
Dose: 16 Cc., or 4 fluidrams.

ERGOTA.—Sclerotium of *Claviceps purpurea*, replacing the grain of rye, *Secale cereale*. 187, 188

Dose: 2 Gm., or 30 grains.

Fluidextractum Ergotæ U. S.—Dose: 2 Cc., or 30 minims.

Extractum Ergotæ, U. S.—Dose: 0.25 Gm., or 4 grs.

Vinum Ergotæ, U. S.—Dose: 8 Cc., or 2 fluidrams.

Ergotoxine, an active substance found in ergot, and a decided irritant.—Dose: 1/100 of a grain.

Tyramine, or hydroxyphenylethylamine, also active.—

Dose: 0.02 Gr., or ½ of a grain.

ERIODICTYON.—*Yerba Santa*.—Leaves of *Eriodictyon californicum* (*Yerba Santa*.)

Dose: 1 Gm., or 15 grains.

Fluidextractum Eriodictyi, U. S.—Dose: 1 Cc., or 15 minims.

Ellixir Eriodictyi Aromaticum, N. F.—To disguise the taste of quinine.

ERNUTIN.—Said to contain ergotoxine, tyramine, and ergamine.

Dose: 30 to 60 minims by mouth, and 5 to 10 hypodermically. 190

Essentia Pepsini, N. F.—Essence of Pepsin.—An agreeably flavored cordial, containing pepsin, U. S. P., 2.25 Gm. (35 gr.); rennin, 1.65 Gm. (25 grs.); lactic acid, 0.2 Cc. (3 minims); preserved with glycerin, 12.5 Cc. (3 fluidrams); alcohol, 5 Cc. (80 minims), in syrup and Angelica wine to 100 Cc. (25 fluidrams).

Dose: 8 Cc., or 2 fluidrams.

ETHER.—See *Æther*.

ETHYL BROMIDE. 40

	Page
ETHYL CHLORIDE.....	40
EUCAINE.....	43, 251
EUCALYPTOL.—Organic oxide (Cineol) obtained from the volatile oil of Eucalyptus and from other sources.	
Dose: 0.3 Cc., or 5 minims.	
EUCALYPTUS.—Leaves of Eucalyptus globulus.....	155
Dose: 2 Gm., or 30 grains.	
Fluidextractum Euonymi, U. S.—Dose: 2 Cc., or 30 minims.	
Elixir Eucalypti, N. F.	
EUGENOL.—Aromatic unsaturated phenol obtained from oil of Cloves and other sources.	
Dose: 0.2 Cc., or 3 minims.	
EUONYMUS.—Bark of root Euonymus atropurpureus.	
Dose: 0.5 Gm., or 7½ grains.	
Fluidextractum Euonymi, U. S.—Dose: 0.5 Cc., or 8 minims.	
Extractum Euonymi, U. S.—Dose: 0.125 Gm., or 2 grains.	
EUPATORIUM.—Leaves and tops of Eupatorium perfoliatum.	
Dose: 2 Gm., or 30 grains.	
Fluidextractum Eupatorii, U. S.—Dose: 2 Cc., or 30 minims.	

EXTRACTA— EXTRACTS (SOLID EXTRACTS).

The soluble principles of drugs extracted with various menstrua, i. e., alcohol or water, or mixtures of these, sometimes by the addition of alkali or acid, concentrated by evaporation either to a soft solid of pilular consistence, or reduced to a powder with or without addition of a diluent such as sugar of milk or pulverized glycyrrhiza. The percentage yield of extract varies considerably from different drugs with a corresponding variation in the proportionate amount of drug the respective extracts represent. The majority are four times the strength of the drug; consequently their dosage is one-fourth that of the drug. The extracts of the alkaloidal drugs are mostly fixed by assay, as indicated. The pilular extracts are best adapted for pill masses, and external preparations: ointments, suppositories, plasters, etc. The powdered extracts for admixtures with powders, although they are also adapted for masses and pills. The extracts of cimicifuga euonymus and leptandra are all equal in therapeutic activity to the respective "resinoids" or "concentrations."

EXTRACTUM COLOCYNTHIDIS COMPOSITUM.—Ext. colocynth, 16; purif. aloes, 50; resin scammony, soap pulv., each 14; cardamom, 6 Gm.....	134
Uses: Pilulæ catharticae comp.; Pil. catharticae vegetabiles; also pills of the N. F.	
Dose: 0.5 Gm., or 1½ grains.	
EXTRACTUM ERGOTÆ.—Represents eight times the fluidextract or drug, purified and concentrated. Well adapted for extemporaneous preparation of solutions for hypodermic use.....	284
Extractum Ferri Pomatum, N. F.—Crude malate of iron.—Ferated extract of apples (Extractum Pomi Ferratum, Ph. Ger.).	
Dose: 0.65 Gm., or 10 grains.	
FEL BOVIS—Oxgall.—Fresh bile of Bos Taurus.	
FEL BOVIS PURIFICATUM.—Purified Oxgall.—Inspissated oxgall	131

IRON COMPOUNDS.

Iron forms two series of compounds: (1) Ferrous, usually greenish in color, and (2) ferric, usually reddish-brown in color.

With the exception of the carbonate, the hydroxide (hydrate) and the hypophosphite, they are all very soluble in water; they are insoluble in alcohol. The so-called scaled salts are all ferric compounds of phosphoric acid, or the organic acids, citric and tartaric; they are rendered more soluble in combination with the citrates, tartrates and phosphates of the respective alkalies: ammonium, potassium and sodium, and some are known as "soluble" salts. The dose of the scale salts, with one exception (that containing strychnine), is 0.25 Gm., or 4 grains. The Latin titles do not distinguish between the ferric and ferrous compounds, but they are so distinguished in the English titles.

FERRI CARBONAS SACCHARATUS.—Saccharated Ferrous Carbonate.—Ferrous carbonate 15 per cent., preserved in sugar.. 98

Greenish-brown powder, partially soluble in water.

Dose: 0.25 Gm., or 4 grains.

Massa Ferri Carbonatis, U. S.—(Vallet's).—Dose: 0.25 Gm., or 4 grains.

Pillulæ Ferri Carbonatis, U. S.—(Blaud's).—Dose: 2 pills.

Mistura Ferri Composita, U. S.—(Griffith's).—Dose: 16 Cc., or 4 fluidrams.

FERRI CHLORIDUM.—Ferric Chloride.—Fe 22 per cent.

Orange-yellow crystalline crusts, very deliquescent.

Dose: 0.065 Gm., or 1 grain.

Liquor Ferri Chloridi, U. S.—Dose: 0.1 Cc., or 1½ minims.

Tinctura Ferri Chloridi, U. S.—Dose: 0.5 Cc., or 8 minims.

Tinctura Ferri Citro-Chloridi, N. F.

FERRI CITRAS.—Ferric Citrate.—Fe 16 per cent.

Garnet-red scales, slowly but completely soluble in water.

FERRI HYDROXIDUM.—Ferric Hydrate.

Freshly prepared, brownish-red magma, insoluble in water.

FERRI HYDROXIDUM CUM MAGNESII OXIDO.—Ferric Hydroxide with Magnesium Oxide.

Arsenic Antidote: to be freshly prepared when wanted as follows: Magnesium oxide 10 Gm. (2½ drams); rub with water to a smooth thin mixture, transfer to a bottle of about 1,000 Cc. (32 fl. oz.) capacity. Fill the bottle to three-fourths full with water, shake thoroughly and add it gradually to the following solution contained in a similar bottle: Solution ferric sulphate 40 Cc. (10 fluidrams) previously diluted with water 125 Cc. (4 fl. ozs.) and shake together until a uniform mixture results.

FERRI HYPOPHOSPHIS.—Ferric Hypophosphite.

Grayish-white powder, practically insoluble in water, more readily soluble in liquids containing dilute hypophosphorous acid and in concentrated solutions of alkali citrates.

Dose: 0.2 Gm., or 3 grains.

Elixir Ferri Hypophosphitis, N. F.

FERRI PHOSPHAS SOLUBILIS.—Fe 12 per cent.

Bright green scales, freely and completely soluble in water.

Elixir Ferri, Quininæ et Strychninæ Phosphatum, U. S.—

Dose: 4 Cc., or 1 fluidram.

FERRI PYROPHOSPHAS SOLUBILIS.—Fe 10 per cent.

Apple-green scales, freely and completely soluble in water.

- FERRI SULPHAS.**—Ferrous Sulphate.....
 Bluish-green prisms, soluble in 0.9 part water, in 0.3 boiling water, insoluble in alcohol.
Massa Ferri Carbonatis, U. S.
- FERRI SULPHAS EXSICCATUS.**—Dried Ferrous Sulphate.
 Crystallized ferrous sulphate dried until it loses about one-third its weight of water and forms a grayish-white powder.
 Dose: 0.125 Gm., or 2 grains.
- FERRI SULPHAS GRANULATUS.**—(Precipitatus, '90).
 Crystallized ferrous sulphate, obtained in granular form.
 Dose: 0.20 Gm., or 3 grains.
Pilulæ Ferri Carbonatis, U. S.
Mistura Splenetica, N. F.
- FERRI ET AMMONII CITRAS.**—Soluble Citrate of Iron. Fe 16 per cent.
 Readily and completely soluble in water.
 Dose: 0.25 Cc., or 4 grains.
- FERRI ET AMMONII SULPHAS.**—Iron and Ammonia Alum.—Fe 11.5 per cent.
 Readily soluble in water.
 Dose: 0.5 Gm., or 7½ grains.
- FERRI ET AMMONII TARTRAS.**—Fe 13 per cent.
 Scales, red to reddish brown.
- FERRI ET POTASSII TARTRAS.**—Fe 15 per cent.
 Scales, red to reddish brown; precipitated, from watery solution by alcoholic liquids.
- FERRI ET QUININÆ CITRAS.**—Fe 13.5 per cent.—Should contain not less than 11.5 per cent. quinine.
 Reddish-brown scales, slowly but completely soluble in water.
 Dose: 0.25 Gm., or 4 grains.
- FERRI ET QUININÆ CITRAS SOLUBILIS.**—Soluble Iron and Quinine Citrate.
 Same iron and quinine strength as preceding; greenish or golden-yellow scales, rapidly and completely soluble in water, also in dilute alcoholic liquids.
 Dose: 0.25 Gm., or 4 grains.
- FERRI ET STRYCHNINÆ CITRAS.**—Fe 16 per cent.—Should contain not less than 0.9 per cent. nor more than 1 per cent. strychnine.
 Red to yellowish-brown scales, readily and completely soluble in water, also in dilute alcoholic liquids.
 Dose: 0.125 Gm., or 2 grains.
- FERRUM.**—Fe.—Metallic Iron in the form of wire.
- FERRUM REDUCTUM.**—Reduced Iron—Iron by Hydrogen—Quenche's Iron.
 Very fine grayish-black powder, containing not less than 90 per cent. pure metallic iron, insoluble in water or alcohol.
 Dose: 0.065 Gm., or 1 grain.
Pilulæ Metallorum, N. F.
- FIGUS.**—Fruit of *Ficus carica*.

FLUIDEXTRACTA—FLUIDEXTRACTS.

(Extracta Fluida, U. S. '90.)

Fluidextracts are liquid extracts of drugs of uniform drug strength, viz.: 1 Cc. represents the soluble constituents of 1 Gm. of the drug (practically 1 grain of drug to the minim). In those indicated the strength is fixed by the alkaloidal

- percentage. The solvents or menstrua are alcohol, or alcohol and water, and sometimes glycerin in various proportions. In a few the menstruum is alkaline; in others acid. Two fluid-extracts are prepared with 10 per cent. acetic acid, which is indicated. For uses see the respective drugs.
- Fluidextractum Adonidis**, N. F.—Bird's Eye.—Dose: 0.13 Cc., or 2 minims.
- FLUIDEXTRACTUM AROMATICUM**.—Pulvis Aromaticus.—Valuable as an addition to liquid mixtures to cover the taste of drugs.—Dose: 1 Cc., or 15 minims.
- FLUIDEXTRACTUM AURANTII AMARI**.—Bitter Orange Peel.—Dose: 1 Cc., or 15 minims.
- Fluidextractum Buchu Compositum**, N. F.—Dose: 2 Cc., or 30 minims, representing about 1.3 Gm. (20 grs.) buchu and 0.25 Gm. (4 grs.) each, cubeb, juniper and uva ursi.
- FŒNICULUM**.—Fruit of *Fœniculum vulgare*.
- FRANGULA**.—Bark of *Rhamnus Frangula*.
Dose: 1 Gm., or 15 grains.
Fluidextractum Frangulæ, U. S.—Dose: 1 Cc., or 15 minims.
- GALLA**.—Excrescence on *Quercus infectoria*.
Dose: 0.5 Gm., or 7½ grains.
Tinctura Gallæ, U. S.—Dose: 4 Cc., or 1 fluidram.
Unguentum Gallæ (20 per cent.).
- GAMBIR**.—(To replace Catechu '90).—Extract prepared from *Ourouparia Gambir*. 106
Dose: 1 Gm., or 15 grains.
Tinctura Gambir Composita, U. S.—Dose: 4 Cc., or 1 fluidram.
Trochisci Gambir, U. S.
Pulvis Catechu Compositus, N. F.
- GAMBOGE**. 134
- GAULTHERIA**. 120, 193
- GELATINUM**.—Gelatine. 114
- Gelatinum Chondri**, N. F.—Irish Moss Gelatin.
- GELATINUM GLYCERINATUM**.—Glycerogelatin.—Gelatin and Glycerine, equal parts.
Flexible mass, or in pieces, readily fusible by the heat of the water-bath and miscible with water and glycerine.
- Glycerogelatina**—Glycerogelatina, N. F.
Glycerogelatinum Acidii Salicylici, 10 per cent.
Glycerogelatinum Iodoformi, 10 per cent.
Glycerogelatinum Zinci Durum, Zinc Oxide, 10 per cent.
Glycerogelatinum Zinci Molle, Zinc Oxide, 10 per cent.
These are melted by gentle heat and applied with a pencil on the affected part.
- GELSEMIUM**.—Roots of *Gelsemium sempervirens*. 151
Dose: 0.065 Gm., or 1 grain.
Tinctura Gelsemii, U. S.—Dose: 0.5 Cc., or 8 minims.
Fluidextractum Gelsemii, U. S.—Dose: 0.05 Cc., or 1 minim.
- GENTIANA**.—Roots of *Gentiana Lutea*. 119
Dose: 1 Gm., or 15 grains.
Fluidextractum Gentianæ, U. S.—Dose: 1 Cc., or 15 minims.
Extractum Gentianæ, U. S.—Dose: 0.25 Gm., or 4 grains.

	Page
Tinctura Gentianæ Composita, U. S.—Dose: 4 Cc., or 1 fluidram.	
Elixir Gentianæ, N. F.	
Elixir Gentianæ cum Tinctura Ferri Chloridi, N. F.	
Elixir Gentianæ et Ferri Phosphatis, N. F.	
Elixir Gentianæ Glycerinatum, N. F.	
Infusum Gentianæ Compositum, N. F.	
GERANIUM.—Rhizome of <i>Geranium maculatum</i> .	
Dose: 1 Gm., or 15 grains.	
Fluidextractum Geranii, U. S.—Dose: 1 Cc., or 15 minims.	
GINGER.	120
GLANDULÆ SUPRARENALES SICCÆ.—Desiccated Suprarenal Glands.—The glands of the sheep or ox, freed from fat, cleaned, dried and powdered; one part represents approximately 6 parts fat-free, fresh glands.	69
Light, yellowish-brown powder, partially soluble in water.	
Dose: 0.25 Gm., or 4 grains.	
GLANDULÆ THYROIDEÆ SICCÆ.—Desiccated Thyroid Glands.—The glands of sheep freed from fat, cleaned, dried and powdered. One part represents approximately 5 parts of the fresh glands.	163
Yellowish amorphous powder partially soluble in water.	
Dose: 0.25 Gm., or 4 grains, in powder, capsule or cachet.	
GLYCERINUM.—Glycerine.—Glycerol, 95 per cent.	196
Liquid, s. g. 1.246, soluble in all proportions of water and of alcohol; also in a mixture of 3 vols. alcohol and 1 ether, insoluble in ether, chloroform, benzoin, fixed and volatile oils.	
Dose: 4 Cc., or 1 fluidram.	
Suppositoria Glycerini, U. S.	

GLYCERITA—GLYCERITES.

Solutions of medicinal substances in Glycerine.

GLYCERITUM ACIDI TANNICI.—Tannic Acid.—20 per cent. by weight.	
Dose: 2 Cc., or 30 minims.	
GLYCERITUM AMYLI.—Unguentum Glycerini.—Starch, 10 per cent.	
Uses: Emollient; vehicle for external uses.	
GLYCERITUM BOROGLYCERINI.—50 per cent. solution of Glyceryl boride in Glycerine.	
GLYCERITUM FERRI, QUININÆ ET STRYCHNINÆ PHOSPHATUM.	
Dose: 1 Cc., or 15 minims, containing about 0.08 Gm. (1¼ gra.) soluble ferric phosphate, 0.12 Gm. (2 grs.) quinine phosphate, and 0.8 mg. (1/80 gr.) strychnine.	
Glyceritum Gualaci, N. F.—Containing in 4 Cc., or 1 fluidram, 0.3 Gm. (5 grs.) Gualac in alkaline menstruum.	
Dose: 2 Cc., or 30 minims (diluted).	
GLYCERITUM HYDRASTIS.—(Fluidextractum Hydrastis Aquosum).—Each Cc. represents 1 Gm. of the principles of hydrastis soluble in water, in solution of equal volumes glycerine and water; forms clear solution with water.	
Dose: 2 Cc., or 30 minims.	

- GLYCERITUM PHENOLIS** (Glyceritum Acidi Carbolici, U. S. '90).
—Liquefied Carbolic Acid, 20 Cc., in 100 Cc.
Dose: 0.3 Cc., or 5 minims.
- Glyceritum Picis Liquidæ** (Tar), N. F.
Dose: 4 Cc., or 1 fluidram, containing about 0.25 Gm. (4 grs.) tar.
- GLYCERYLIS NITRAS**.—See Spiritus..... 79
- GLYCYRRHIZA**.—Root of *Glycyrrhiza glabra*..... 198
Dose: 2 Gm., or 30 grains.
Fluidextractum *Glycyrrhizæ*, U. S.—Dose: 2 Cc., or 30 minims.
Extractum *Glycyrrhizæ* Purum, U. S.—Dose: 1 Gm., or 15 grains.
Mistura *Glycyrrhizæ* Composita, U. S.—Dose: 8 Cc., or 2 fluidrams.
Pulvis *Glycyrrhizæ* Compositus, U. S.—Dose: 4 Gm., or 60 grains.
Trochisci *Glycyrrhizæ* et Opii, U. S.
Elixir *Glycyrrhizæ*, N. F.
Elixir *Glycyrrhizæ* Aromaticum, N. F.
Syrupus *Glycyrrhizæ*, N. F.
- GLYCYRRHIZINUM AMMONIATUM**.—"Glycyrrhizin."—The sweet principle of licorice combined with ammonia to make it soluble.
Brownish-red scales, readily soluble in water and in alcohol, precipitated by dilute acids.
Uses: To disguise the bitter taste of quinine, etc.
Dose: 0.25 Gm., or 4 grains.
- GOSSYPII CORTEX**.—Bark of root *Gossypium herbaceum*.
Dose: 2 Gm., or 30 grains.
Fluidextractum *Gossypii Radicis* ('90).—Dose: 2 Cc., or 30 minims.
- GOSSYPIUM PURIFICATUM**.—"Absorbent" Cotton—Purified Cotton.
Gossypium Stypticum, N. F.—Cotton saturated with a dilute solution ferric chloride, containing a little glycerine, pressed and dried.
- GRANATUM**.—Bark of stem and root *Punica Granatum*.
Dose: 2 Gm., or 30 grains.
Fluidextractum *Granati*, U. S.—Dose: 2 Cc., or 30 minims.
- GRINDELIA**.—Leaves and tops of *Grindelia robusta*.
Dose: 2 Gm., or 30 grains.
Fluidextractum *Grindeliæ*, U. S.—Dose: 2 Cc., or 30 minims.
Elixir *Grindeliæ*, N. F.
- GUAIACOL**.—One of the chief constituents of Creosote.....115, 255
Colorless, refractive liquid, s. g. 1.14, or crystalline solid, soluble in 53 parts water; in alcohol and ether in all proportions.
Dose: 0.5 Cc., or 8 minims; in capsules; also in elixir.
- GUAIACOLIS CARBONAS**.—Guaiaacol Carbonate..... 115
White crystalline powder, insoluble in water, soluble in 48 parts alcohol, 1.5 parts chloroform, 13 parts ether, slightly soluble in glycerine and fixed oils.
Dose: 1 Gm., or 15 grains (in capsule).
- GUAIAACUM**.—Resin of wood of *Guaiaacum officinale*.
Uses: Alternative, antirheumatic, diaphoretic, emmenagogue.

- Tinctura Gualiaci, U. S.—4 Cc., or 1 fluidram.
 Tinctura Gualiaci Ammoniata, U. S.—Dose: 2 Cc., or 30 minims.
 Tinctura Gualiaci Composita, N. F.
 Tinctura Antacrida (Fenner's Gualiac Mixture), N. F.
 Mistura Gualiaci, N. F.
 Glyceritum Gualiaci, N. F.
- GUARANA.**—Paste of seeds of *Paullinia cupana*.—Should contain not less than 3.5 per cent. alkaloidal principles (chiefly caffeine).
 Dose: 2 Gm., or 30 grains.
 Fluidextractum Guaranae, U. S.—Dose: 2 Cc., or 30 minims.
 Elixir Guaranae N. F.
 Elixir Cocæ et Guaranae, N. F.
- HÆMATOXYLON.**—Heartwood *Hæmatoxylon Campechianum*.... 106
 Extractum Hæmatoxylon, U. S.—Dose: 1 Gm., or 15 grains.
- HAMAMELIDIS CORTEX.**—Bark of *Hamamelis virginiana*..... 106
 Dose: 2 Gm., or 30 grains.
 Aqua Hamamelidis, U. S.—Dose: 8 Cc., or 2 fluidrams; rarely internally.
- HAMAMELIDIS FOLIA.**—(*Hamamelis* '90).
 Fluidextractum Hamamelidis Foliorum, U. S.—Dose: 2 Cc., or 30 minims.
- HEDEOMA.**—Leaves and tops *Hedeoma pulegioides*.
 Dose: 8 Gm., or 120 grains.
- HEROIN.**.....50, 150
- HEXAMETHYLENAMINA.** — Hexamethylenamine — Hexamethylene-tetramine.—Condensation product obtained by the action of ammonia on formaldehyde..... 141
 Colorless crystals, soluble in 1.5 parts water, 10 parts alcohol, 228 parts ether; decomposed by acids and alkalis.
 Dose: 0.25 Gm., or 4 grains, in solution or in effervescent combinations. See *Pulveres Effervescentes*.
- HOMATROPINÆ HYDROBROMIDUM.**—Hydrobromide of an alkaloid, by the condensation of tropine and mandelic acid.
 White crystalline powder, or prisms, soluble in 5.7 parts water, 32.5 parts alcohol, practically insoluble in chloroform or ether.
 Dose: 0.0005 Gm., equal to 0.5 mg., or 1/128 grain.
- HUMULUS.**—Strobiles of *Humulus Lupulus*.
 Dose: 2 Gm., or 30 grains.
 Fluidextractum Humuli, N. F.—Dose: 2 Cc., or 30 minims.
 Elixir Humuli, N. F.
- HYDRARGYRUM.**—Mercury—Quicksilver.—Hg., Metal; liquid, s. g. 13.535.
 Insoluble in ordinary solvents, but miscible with saccharine substances and fats through which, by trituration, the particles of the metal may be so finely divided as not to be discernible by the naked eye yet become exceedingly active medicinally.
 The following preparations of the metal are official:
- HYDRARGYRUM CUM CRETA.**—Mercury with Chalk. 38 per cent., Hg.
 Dose: 0.25 Gm., or 4 grains.
 Massa Hydrargyri, U. S.—(33 per cent.).—Dose: 0.25 Gm., or 4 grains.

Unguentum Hydrargyri, U. S.—(50 per cent.).
 Unguentum Hydrargyri Dilutum, U. S.—(33 per cent.).
 Emplastrum Hydrargyri, U. S.—(30 per cent.).

COMPOUNDS OF MERCURY.....126, 166

Mercury forms two series of compounds which are not distinguished in the Latin titles as they are in their English titles:

1. Mercurous, sparingly soluble and less active, and
2. Mercuric, more readily soluble in water and alcohol and so irritant as to be classed with the poisons.

Poison.—Antidote: Albumen, egg white, milk.

Properties.—The mercurous compounds, of which the chloride (calomel) is a type, powerfully stimulate the glandular system and are antiseptic and alterative. The mercuric compounds, of which the chloride (corrosive sublimate) is a type, are potent alteratives and powerful antiseptics and germicides. They may easily be distinguished by the different coloration produced with liquor calcis (lime water). See *Lotio Flava* and *Lotio Nigra*, N. F.

HYDRARGYRI CHLORIDUM CORROSIVUM.—Mercuric Chloride.

—Bichloride of Mercury.....167, 203

Heavy crystals, or crystalline masses, soluble in 13 parts water, 3 parts alcohol, 14 parts glycerine.

Incompatible with: alkalies, salts of copper, lead and zinc. For solution 2 in 1,000; mercuric chloride, 2 Gm., sterile water 1,000 Cc., or 29 grains to 32 fl. oz.

Dose: 0.003 Gm., equal to 3 mg., or 1/20 grain.

Lotio Flava, N. F.

HYDRARGYRI CHLORIDUM MITE.—Mild Mercurous Chloride.—

Calomel.....115, 139

White powder, insoluble in water, alcohol, ether.

Incompatible: Alkalies, iodine, iodides and bromides.

Dose: Laxative, 0.125 Gm. (2 grs.); alterative, 0.065 Gm.

(1 gr.).

Pilulæ Catharticæ Compositæ, U. S.—Dose: 2.

Pulvis Hydrargyri Mitis et Jalapæ, N. F.

Lotio Nigra, N. F.

HYDRARGYRI IODIDUM FLAVUM.—Yellow Mercurous Iodide.—

Protiodide.

Bright yellow powder, insoluble in water, alcohol, etc.

Dose: 0.010 Gm., equal to 10 mg., or 1/5 grain.

HYDRARGYRI IODIDUM RUBRUM.—Red Mercuric Iodide.—

Biniodide.....203

Scarlet red powder, almost insoluble in water, soluble in 116 parts alcohol, 85 parts ether.

Dose: 0.003 Gm., equal to 3 mg., or 1/20 grain.

Liquor Arseni et Hydrargyri Iodidi, U. S.—Dose: 0.2 Cc., or 3 minims.

Liquor Hydrargyri et Potassii Iodidi (Channing's), N. F.

HYDRARGYRI OXIDUM FLAVUM.—Yellow Mercuric Oxide.

Orange-yellow heavy impalpable powder, almost insoluble in water, insoluble in alcohol.

Unguentum Hydrargyri Oxidi Flavi, U. S.—(10 per cent.).

HYDRARGYRI OXIDUM RUBRUM.—Red Mercuric Oxide.—Red

Precipitate.

Heavy orange-red scales or crystalline powder, almost insoluble in water, insoluble in alcohol.

Unguentum Hydrargyri Oxidi Rubri, U. S.—(10 per cent.).

	Page
HYDRARGYRUM AMMONIATUM. —Ammoniated Mercury.—White Precipitate. White pulverulent pieces or powder, insoluble in water or alcohol. Unguentum Hydrargyri Ammoniat, U. S.—(10 per cent.).	
HYDRARGYRUM SUCCINIMIDE. Dose: 1/5 of a grain hypodermically.	
HYDRASTINA. —Alkaloid (white) from Hydrastis. White, sometimes large prisms, almost insoluble in water, soluble in 135 parts alcohol, 124 parts ether, 2 parts chloroform. Uses: Alterative, bitter tonic, uterine hemostatic, sedative. Dose: 0.010 Gm., equal to 10 mg., or 1/5 grain. Externally in solution, sometimes with bismuth citrate.	
HYDRASTININÆ HYDROCHLORIDUM. —Hydrochloride of an artificial alkaloid derived from Hydrastis. Yellowish white needles or crystalline powder, very soluble in water and in alcohol. Dose: 0.030 Gm., equal to 30 mg., or ½ grain (pill).	
HYDRASTIS. —Rhizome of Hydrastis canadensis.—2.5 per cent. Hydrastine. 190 Dose: 2 Gm., or 30 grains. Tinctura Hydrastis, U. S.—Dose: 4 Cc., or 1 fluidram. Fluidextractum Hydrastis, U. S.—Dose: 2 Cc., or 30 minims. Syrupus Rhei et Potassæ Compositus, N. F.	
HYOSCINÆ HYDROBROMIDUM. —Hydrobromide of an alkaloid chemically identical with scopolamine, obtained from hyoscyamus and other plants of the Solanaceæ. 59 Rhombic crystals, soluble in 1.5 parts water, 16 parts alcohol, 750 parts chloroform, insoluble in ether. Dose: 0.0005 Gm., equal to 0.5 mg.; or 1/128 grain.	
HYOSCYAMINÆ HYDROBROMIDUM. —Alkaloid from Hyoscyamus 59 Crystals or resin-like mass, very soluble in water, alcohol and chloroform, insoluble in ether. Dose: 0.0005 Gm., equal to 0.5 mg., or 1/128 grain.	
HYOSCYAMINÆ SULPHAS. —Alkaloid from Hyoscyamus. 59 Crystals or white powder, very soluble in water and in alcohol. Uses: Similar to the Hydrobromide (in granules). Dose: 0.0005 Gm., equal to 0.5 mg., or 1/128 grain.	
HYOSCYAMUS. —Leaves and tops of Hyoscyamus niger.—0.08 per cent. alkaloids. 59, 150 Uses: Anodyne, antispasmodic, sedative. Dose: 0.250 Gm., or 4 grains. Tinctura Hyoscyami, U. S.—(10 per cent.).—Dose: 2 Cc., or 30 minims. Fluidextractum Hyoscyami, U. S.—Dose: 0.2 Cc., or 3 minims. Extractum Hyoscyami, U. S.—Dose: 0.065 Gm., or 1 grain. Oleum Hyoscyami Compositum, N. F.	
HYPOPHOSPHITES. 173	
ICHTHYOL. 201	

INFUSA—INFUSIONS.

Infusions not otherwise directed are prepared by the following general formula: Take of the drug (cut or bruised), 5 Gm. (75 grains), boiling water sufficient to make 100 Cc. (25

fluidrams). The boiling water is poured on the drug contained in non-metallic vessel and left to stand, well covered, for one-half hour in a warm place; it is then expressed and water added through strainer to make up to the required measure. Infusions should not be made from fluidextracts.

Caution.—With potent drugs the strength should be specified by the prescriber.

The following infusions vary in strength, and are prepared by special methods:

INFUSUM DIGITALIS.

R	Digitalls.	gr. xxv	1/5
	Alcoholis.	fl. 3iiss	10
	Aquæ cinnamomi.	fl. 3iv	15
	Aquæ bullentis, q. s.	fl. 3xxv	100

Dose: 8 Cc., or 2 fluidrams.

INFUSUM SENNÆ COMPOSITUM.—(Black Draught).

Dose: 120 Cc., or 4 fluid ounces, representing about 7 Gm. (100 grs.) senna, 14 Gm. (200 grs.), each manna and magnesium sulphate, with fennel.

IODIDES.—The iodides should not be mixed with alkaloids..... 169

ODOFORMUM.—Iodoform—Triiodomethane. 171

Lemon-yellow powder, or crystals, practically insoluble in water, soluble in 46.7 parts alcohol, 5.2 parts ether, and in fixed and volatile oils and glycerine.

Iodoformum Aromatisatum.—Deodorized Iodoform, N. F. Iodoform containing 4 per cent. Cumarin.—The odor of iodoform may be removed by washing in aqueous solution of tannic acid.

IODOLUM.—Iodol—Tetralodopyrrol—89 per cent. I.—Derivative of pyrrol by action of iodine.

Grayish-brown crystalline powder, practically insoluble in water, soluble in 1.5 parts ether, 105 parts chloroform and in fixed oils.

Dose: 0.250 Gm., or 4 grains.

IODUM.—Iodine (Resublimed).

Heavy bluish-black plates, s. g. 4.95, practically insoluble in water, soluble in 10 parts alcohol, freely in ether, chloroform and carbon disulphide.

Dose: 0.005 Gm., equal to 5 mg., or 1/10 grain.

Tinctura Iodi, U. S.—(7 per cent.).

Liquor Iodi Compositus, U. S.—Dose: 0.2 Cc., or 3 minims.

Unguentum Iodi, U. S.—(4 per cent.).

Liquor Iodi Carbolatus, N. F.

Liquor Iodi Causticus, N. F.

Tinctura Iodi, Churchill, N. F.

Tinctura Iodi Decolorata, N. F.

Linimentum Iodi, N. F.

Collodium Iodatum, N. F.

Acidum Carbolicum Iodatum (Phenol Iodatum), N. F.

Amylum Iodatum, N. F.

IPECACUANHA.—Root of *Cephælis Ipecacuanha*, or of *C. acuminata* (Carthagena)—1.75 per cent. alkaloids.....145, 149

Dose: Expectoant, 0.065 Gm. (1 gr.); emetic, 1 Gm. (15 grs.).

Fluidextractum Ipecacuanhæ, U. S.—Dose: Expectoant, 0.05 Cc.; emetic, 1 Cc.

Syrupus Ipecacuanhæ, U. S.—Dose: Expectoant, 1 Cc., or 15 minims.

	Page
Vinum Ipecacuanhæ, U. S.—Dose: 1 Cc., or 15 minims.	
Tinctura Ipecacuanhæ et Opii, U. S.—Dose: 0.5 Cc., or 8 minims.	
Pulvis Ipecacuanhæ et Opii, U. S.—Dose: 0.5 Gm., or 7½ grains.	
Syrupus Ipecacuanhæ et Opii, N. F.	
Trochisci Ipecacuanhæ, N. F.	
IRON.	98, 275, 286
JALAPA.—Tuberous root <i>Exogonium purga</i> .—Should contain 7 per cent. resin; 1.5 per cent. resin soluble in ether.	134
Dose: 1 Gm., or 15 grains.	
Resina Jalapæ, U. S.—Dose: 0.125 Gm., or 2 grains.	
Pulvis Jalapæ Compositus, U. S.—Dose: 2 Gm., or 30 grains.	
Fluidextractum Jalapæ, N. F.	
Tinctura Jalapæ Comp., N. F.	
JUNIPERUS.	156
KAOLINUM.—Kaolin—(Pipe Clay—China Clay).—Native aluminum silicate, powdered and purified by elutriation.	
Cataplasma Kaolini.	
KINO.—Inspissated juice of <i>Pterocarpus marsupium</i>	106
Dark red fragments, slowly soluble in water, readily in alcohol, insoluble in ether.	
Uses: Astringent, styptic.	
Dose: 0.5 Gm., or 7½ grains.	
Tinctura Kino, U. S.—Dose: 4 Cc., or 1 fluidram.	
Tinctura Kino Composita, N. F.	
Pulvis Kino Compositus, N. F.	
KRAMERIA.—Root of <i>Krameria triandra</i> ; <i>K. Ixina</i> and <i>K. argentea</i>	106
Dose: 1 Gm., or 15 grains.	
Tinctura Krameriaë, U. S.—Dose: 4 Cc., or 1 fluidram.	
Fluidextractum Krameriaë, U. S.—Dose: 1 Cc., or 15 minims.	
Extractum Krameriaë, U. S.—Dose: 0.5 Gm., or 7½ grains.	
Syrupus Krameriaë, U. S.—Dose: 4 Cc., or 1 fluidram.	
Trochisci Krameriaë, U. S.	
Lac Fermentatum, N. F.—Kumyss.—Fermented cow's milk.	
Lac Humanisatum, N. F.—Humanized milk.	
R Humanizing milk powder (N. F.) gr. c 6½	
Fresh cows' milk fl. ℥ii 62	
Fresh sweet cream fl. ℥ss 15	
Water. fl. ℥ii 62	
Triturate the milk powder with the water; transfer the mixture into a clean bottle containing the milk and cream, and immerse the bottle in water heated to 88 C. (100 F.) for 15 minutes. Then pour the mixture into a vessel, in which heat it quickly to boiling, and then immediately allow it to cool to the body temperature.	
Note.—Humanized Milk should be prepared immediately before use. If the above directions are carefully followed, the milk will be peptonized, and the pancreatin of the milk powder rendered sterile.	
LACTUCARIUM.—Concrete milk-juice of <i>Lactuca virosa</i> .	
In masses or irregular pieces, reddish-brown internally, partly soluble in water, alcohol and in ether.	
Dose: 1 Gm., or 15 grains.	
Tinctura Lactucarii, U. S.—(50 per cent.).—Dose: 2 Cc., or 30 minims.	
Syrupus Lactucarii, U. S.—Dose: 8 Cc., or 2 fluidrams.	

LAPPA. —Root of <i>Arctium Lappa</i> and other species. Dose: 2 Gm., or 30 grains. Fluidextractum Lappæ, U. S.—Dose: 2 Cc., or 30 minims.	
LARD.	197
LEAD.	107
LEPTANDRA. —Rhizome of <i>Veronica virginica</i> . Dose: 1 Gm., or 15 grains. Fluidextractum Leptandræ, U. S.—Dose: 1 Cc., or 15 minims. Extractum Leptandræ, U. S.—Dose: 0.25 Gm., or 4 grains.	
LIMONIS CORTEX. —Fresh rind of fruit <i>Citrus Limonum</i> . Tinctura Limonis, U. S.	
LIMONIS SUCCUS. —Lemon juice.	

LINIMENTA—LINIMENTS.

Solutions of medicinal substances in alcohol, oil or liquid soap, for external application.....	193
Linimentum Aconiti et Chloroformi , N. F.—Fluidextract aconite, 4.5; chloroform, 12.5, in alcohol, 100 Cc. Uses: Anodyne, embrocation.	
LINIMENTUM AMMONIÆ. —Ammonia water, 35 Cc., in oil, 100 Cc.	
Linimentum Ammonii Iodidi , N. F.—About 5 per cent. ammonium iodid in 100 Cc.	
LINIMENTUM BELLADONNÆ. —Camphor, 5 Gm., in fluidextract belladonnæ, 100 Cc. Uses: Anodyne, analgesic.	
LINIMENTUM CALCIS. —Lime water and linseed oil, equal volumes.	
LINIMENTUM CAMPHORÆ. —Camphor, 20 Gm., in oil, 100 Cc.	
LINIMENTUM CHLOROFORMI. —Chloroform, 30 Cc., in soap, liniment, 100 Cc.	
Linimentum Iodi , N. F.—(Similar to Br. Ph.)—Iodine, 12.5 Gm.; potassium iodide, 5 Gm.; glycerine, 3.5 Cc.; water, 6.5 Cc.; alcohol to 100 Cc. Uses: Discutient.	
Linimentum Opii Compositum , N. F.—Tincture opii, 10; camphor, 1.75; alcohol, 25; oil peppermint, 2.5 ammonia water, 37.5; oil turpentine, to 100 Cc. Uses: Analgesic.	
LINIMENTUM SAPONIS. —Soap, 6; camphor, 4.5, in alcohol, 100 Cc.	
LINIMENTUM SAPONIS MOLLIS. —Soft soap, 65, in alcohol, 100 Cc. Uses: Antiseptic, stimulant.	
LINIMENTUM TEREBINTHINÆ. —Resin cerate, 65, in oil, turpentine, 100 Cc.	
Linimentum Tiglli , N. F.—Croton oil, 16; oil cajuput, alcohol, each 54 Cc.	
Linimentum Tiglli Compositum , N. F.—Croton oil, sassafras oil and turpentine oil each 20; olive oil, 40 Cc.	
LINUM. —Flaxseed.—Seed of <i>Linum usitatissimum</i> .	

LIQUOR ACIDI ARSENOSI.—Arsenous Acid.—Arsenic trioxide, 1 per cent.

LIQUOR AMMONII ACETATIS.—(Spirit Mindererus)—A solution of diluted acetic acid nearly saturated with ammonium carbonate; to be of slight acid reaction. Should be prepared as wanted.

Uses: Diaphoretic, diuretic, refrigerant.

Dose: 16 Cc., or 4 fluidrams, containing about 1 Gm. (15 grs.) ammonium acetate.

Liquor Ferri et Amonii Acetatis, U. S.

LIQUOR ANTISEPTICUS.—Antiseptic Solution (Lister).—A solution of boric acid, 2 per cent.; benzoic acid and thymol, each one per cent.; eucalyptol and oils of peppermint, gaultheria, thyme and 25 per cent. alcohol. Essentially similar to the various proprietary solutions.

Dose: 4 Cc., or 1 fluidram.

Liquor Antisepticus Alkalinus, N. F.—Alkaline Antiseptic.—Aqueous solution, with 25 per cent. glycerine, containing potassium bicarbonate and sodium benzoate, each 3.2; sodium borate, 0.8; oil gaultheria, 0.04; thymol, eucalyptol and oil peppermint, each 0.02 in 100 Cc., colored purplish red with persianis. To replace a well-known alkaline antiseptic solution of similar composition. Prescribed under its official name and dispensed in plain bottle (without the name blown in the glass) this article will not become known to the public as a cure-all.

LIQUOR ARSENI ET HYDRARGYRI IODIDI.—Donovan's Solution.—Solution of arsenous iodide and red mercuric iodide, each 1 per cent.

Dose: 0.1 Cc., or 1½ minims.

Liquor Auri et Arseni Bromidi, N. F.—Solutions of bromide of Gold and Arsenic.—0.6 Cc. (10 minims) contains 0.002 Gm. (1/32 gr.) tribromide of gold and the equivalent of 0.005 Gm. (1/13 gr.) tribromide of arsenic. Essentially similar in composition to "Arsenauro," this formula insuring a product of uniform strength.

Uses: Alterative, antiepileptic, antidiabetic, tonic.

Dose: 0.2 Cc., or 3 minims.

LIQUOR CALCIS.—(Aqua Calcis, Lime Water).—Containing not less than 0.17 per cent. calcium hydroxide at 15 C. (59 F.); less at higher temperature.

Lime water is often inert, the calcium hydroxide on exposure to air having been converted into the insoluble carbonate. Lime water when saturated should on boiling in a test-tube show separation of calcium hydroxide on the sides of the tube.

Dose: 16 Cc., or 4 fluidrams. (Containing about 0.02 Gm. (½ gr.) calcium hydroxide).

LIQUOR CHLORI COMPOSITUS.—(Aqua Chlori '90).—Chlorine water.

Solution containing, when freshly prepared, about 0.4 per cent. chlorine with some oxides of chlorine and potassium chloride. By the process now official chlorine water may be prepared in a few minutes without elaborate preparation.

Dose: 4 Cc., or 1 fluidram.

Liquor Coccineus, N. F.—Cochineal Color.

- LIQUOR CRESOLIS COMPOSITUS.**—Compound Solution of Cresol.—Solution of cresol, 50 per cent., in soft, or green soap. Practically identical with Lysol and similar preparations known by fancy trade names.
- Liquor Ferri Albuminati, N. F.**—Albuminate of Iron Solution.—Agreeably flavored, non-styptic solution, representing nearly 0.7 per cent. metallic iron, masked in the form of albuminate, contains about 20 per cent. (vol.) alcohol.
Uses: Hematinic.
Dose: 8 Cc., or 120 minims.
- LIQUOR FERRI ET AMMONII ACETATIS.**—Basham's Mixture. Tincture ferri chloride, 4 Cc. (1 fldr.); diluted acetic acid, 6 Cc. (1½ fldrs.); sol. ammon. acetate, 50 Cc. (12½ fldrs.); arom. elixir, 12 Cc. (3 fldrs.); glycerine, 12 Cc. (3 fldrs.); water to 100 Cc. (25 fldrs.)..... 140
Dose: 16 Cc., or 4 fluidrams.
- LIQUOR FERRI CHLORIDI.**—Anhydrous Ferric Chloride, 29 per cent.
- Liquor Ferri Peptonati, N. F.**—Solution Peptonate of Iron.—An agreeably flavored, non-styptic solution, representing about 0.65 per cent. metallic iron, masked in the form of peptonate; it contains about 20 per cent. (vol.) alcohol.
Dose: 8 Cc., or 2 fluidrams.
- Liquor Ferri Peptonati cum Mangano, N. F.**—Solution of Peptonate Iron with Manganese.—An agreeably flavored, non-styptic solution, representing about 0.4 per cent. metallic iron and 0.2 per cent. metallic manganese masked in the form of peptonates and containing about 25 per cent. (vol.) alcohol.
Dose: 8 Cc., or 2 fluidrams.
- Liquor Ferri Protochloridi, N. F.**—Ferrous Chloride, 30 per cent.
Dose: 0.65 Cc., or 10 minims, diluted with syrup.
- LIQUOR FERRI SUBSULPHATIS.**—Monsell's Solution.—Containing basic ferric sulphate, corresponding to 13.57 per cent. metallic iron.
- LIQUOR FORMALDEHYDI.**—Formalin.—Aqueous solution containing absolute formaldehyde, 37 per cent., an oxidation product of methyl alcohol..... 202
 Volatile liquid, s. g. 1.075, its vapor exceedingly irritant on the mucous membrane, which may be protected through lubrication with petrolatum.
 Incompatible with alkalies, forming ammonia, hexamethylenamine.
- LIQUOR HYDRARGYRI NITRATIS.**—Mercuric Nitrate, 60 per cent.
- Liquor Hydrargyri et Potassii Iodidi, N. F.**—Channing's Solution.—Red mercuric iodide, 1 Gm. (15 grs.); potassium iodide, 0.8 Gm. (12 grs.); distilled water, 100 Cc. (25 fluidrams).
Dose: 0.2 Cc., or 3 minims.
- Liquor Hypophosphitum, N. F.**—Solution of Hypophosphites.
Dose: 4 Cc., or 1 fluidram, contains 0.13 Gm. (2 grs.) calcium hypophosphite, 0.08 Gm. (1¼ gr.) sodium hypophosphite, and 0.065 Gm. (1 gr.) potassium hypophosphite.
- Liquor Hypophosphitum Compositus, N. F.**—Compound Solution of hypophosphites.—An agreeably flavored solution, containing 25 per cent. glycerine instead of sugar.
Dose: 4 Cc., or 1 fluidram, contains of the following hypo-

- phosphites: Calcium and potassium, each 0.03 Gm. ($\frac{1}{4}$ gr.); iron, 0.015 Gm. ($\frac{1}{4}$ gr.); sodium, manganese and quinine, each 0.008 Gm. ($\frac{1}{8}$ gr.); strychnine (alkaloid), 0.25 mg. (1/256 gr.).
- Liquor Iodi Carbolutus**, N. F.—Boulton's Solution—French Mixture.—Mixture of: Liquor Iodi comp., 1.5 Cc. (25 minims); phenolis liq., 0.6 Cc. (10 minims); glycerini, 16.5 Cc. (4 fluidrams); aquæ q. s. 100 Cc. (25 fluidrams); exposed to light till colorless.
- Liquor Iodi Causticus**, N. F.—Iodine Caustic, Churchill's.—Iodine, 25 Gm.; potassium iodide, 50 gm.; water, 100 Cc.
Uses: Antiseptic, counter-irritant, caustic.
- LIQUOR IODI COMPOSITUS**.—Lugol's Solution.—Iodine, 5 Gm.; potassium iodide, 10 Gm., in water, 100 Gm.
Dose: 0.2 Cc., or 3 minims.
- LIQUOR MAGNESII CITRATIS**.—Citrate of Magnesia Solution.—Solution of magnesium citrate in a slightly acidulous effervescent solution. 136
Dose: 360 Cc., or 12 fluid ounces (contents of one bottle).
- Liquor Magnesii Sulphatis Effervescens**, N. F.—An agreeably effervescent solution, containing in the contents of one bottle 350 Cc. (12 fluid ounces), 25 Gm. (360 grs.) magnesium sulphate.
Dose: Adult, contents of one bottle.
- Liquor Pancreaticus**, N. F.—Pancreatic Solution.
Dose: 4 Cc., or 1 fluidram, represents 0.065 Gm. (1 gr.) pancreatin, U. S.
- Liquor Pepsini**, N. F.—Liquid Pepsin.—Glycerite pepsin, 5 Cc.; hydrochloric acid; 1 Cc.; glycerine, 31 Cc.; water to 100 Cc.
Dose: 8 Cc., or 2 fluidrams, represent about 0.08 Gm. ($\frac{1}{4}$ gr.) pepsin, U. S.
- Liquor Pepsini Aromaticus**, N. F.—Aromatic Solution with 25 per cent. Glycerine.—Containing about 0.12 Gm. (2 grs.) pepsin, U. S., in 8 Cc., 2 fluidrams, the average dose.
- Liquor Phosphatum Acidus**, N. F.—Acid Phosphates.—Solution of the bone phosphates in water.
Uses: Bone nutrient, tonic.
Dose: 8 Cc., or 2 fluidrams (diluted).
- Liquor Phosphori**, N. F.—Thompson's Solution of Phosphorus.—A solution of phosphorus in alcohol and glycerine, flavored with peppermint, containing about 0.07 Gm. (1 gr.) phosphorus in 100 Cc. (25 fluidrams).
Dose: 0.65 Cc., or 10 minims, about 0.4 mg. (1/150 gr.) phosphorus. Must not be confounded with Spiritus Phosphori, N. F.
- Liquor Picis Alkalinus**, N. F.—Alkaline Solution of Tar.—Liquor Carbonis Detergens.—Solution of tar, 25 Gm., in potassium hydroxide, 12.5 Gm.; water, 62.5 Cc.
Uses: External, antiseptic.
- LIQUOR PLUMBI SUBACETATIS**.—Goulard's Extract.—Solution containing lead subacetate, 25 per cent.
- LIQUOR PLUMBI SUBACETATIS DILUTUS**.—Lead water.—Solution lead subacetate, 4 Gm.; distilled water, to 100 Gm.
- LIQUOR POTASSII ARSENITIS**.—Fowler's Solution.—Solution prepared from 2 Gm. potassium carbonate and 1 Gm. arsenic trioxide; tr. lavender comp., 3 Cc., and water to make 100 Gm.
Dose: 0.2 Cc., or 3 minims.

LIQUOR POTASSII CITRATIS.—Solution Potassium Citrate.—Potassii bicarbonatis, 8 Gm. (120 grs.); acidi citrici, 6 Gm. (90 grs.); aqua dest. ad. 100 Cc. (25 fldrs.); should be prepared when wanted.

Dose: 16 Cc., or 4 fluidrams.

Liquor Seriparus, N. F.—Liquid Rennet.—Solution of fresh calves' rennet, 10 per cent., preserved with sodium chloride, 4 per cent., and alcohol, 18 per cent. (vol.).

Use: Digestant.

Note.—For curdling milk without separating the whey as a distinct layer, this liquid should be added to the milk, previously warmed to a temperature of about 35 C. (95 F.), and the mixture should then be set aside undisturbed, until it coagulates. If the whey is to be separated, the Liquid Rennet should be added to the milk while cold, and the mixture heated to about 35 C. (95 F.), but not exceeding 40 C. (104 F.). One part of the liquid should coagulate between 200 and 300 parts of cows' milk.

LIQUOR SODÆ CHLORINATA.—Labarraque's Solution. Solution of several chlorine compounds of sodium containing at least 2.4 per cent. by weight of chlorine.

Uses: Disinfectant, deodorant, bleacher.

LIQUOR SODII ARSENATIS.—Containing exsiccated Sodium Arsenate, 1 per cent.

Dose: 0.2 Cc., or 3 minims.

Liquor Sodii Boratis Compositus, N. F.—Dobell's Solution.—Sodii boratis, sodii bicarbonatis, each 1.5 Gm. (24 grs.); phenolis (acidi carbolici), 0.3 Gm. (5 grs.); glycerini, 3.5 Cc. (1 fluidram); aquæ sterilatæ, q. s., 100 Cc. (25 fluidrams).

Uses: The earliest of alkaline antiseptic solutions, preferable when carboic acid is not contraindicated.

Liquor Sodii Carbolatis, N. F.—A solution of Phenol (carboic acid) 50 per cent. in water with sodium hydroxide, 3.5 per cent.

Uses: Deodorant, disinfectant.

Liquor Sodii Citro-Tartratis Effervescens, N. F.—Tartro-Citric Lemonade.—An agreeable effervescent solution of sodium tartrate and a little citric acid.

Uses: Refrigerant, laxative, aperient.

Dose: Contents of one bottle, 360 Cc. (12 fluid ounces).

LIQUOR SODII PHOSPHATIS COMPOSITUS.—A so-called 100 per cent. solution of sodium phosphate (sodium citro-phosphate), containing 0.4 per cent. sodium nitrate; similar in composition to certain proprietary articles (Melachol, etc.)..... 132

Dose: 8 Cc., or 2 fluidrams.

Liquor Strychninæ Acetatis, N. F.

Dose: 0.6 Cc., or 10 minims, containing 0.0013 Gm. (1/48 gr.) strychnine acetate.

LIQUOR ZINCI CHLORIDI.—Containing Zinc Chloride, 50 per cent.

Uses: Deodorant, disinfectant (injection in 1/4 to 1 per cent. solution).

LIQUORICE...... 198

LITHIUM COMPOUNDS.

According to the best authorities the uric acid theory is a delusion. The generally accepted belief that the salts of lithium, citrates, etc., eliminate uric acid by combining with

it to form soluble urates has led to the manufacture of endless combinations of lithium and other alkaline salts. The medical profession is being exploited by many of these combinations with fancy suggestive trade names, and through the most alluring therapeutic allegations, often only preliminary to their general introduction to the lay public. Whatever virtues these lithium combinations may have are fully represented in the various effervescent lithium preparations of the U. S. P. and N. F. as here shown. (See also *Pulveres Effervescentes*.)

LITHII BENZOAS.—Lithium Benzoate.

Light white powder, or crystalline scales, soluble in 3 parts water, 13 parts alcohol.

Dose: 1 Gm., or 15 grains; in powder or effervescent combination.

LITHII BROMIDUM.—Lithium Bromide.

White granular salt, very soluble in water and alcohol.

Dose: 1 Gm., or 15 grains (in elixir).

Elixir Lithii Bromidi, N. F.

LITHII CARONAS.—Lithium Carbonate.

Light white powder, soluble in 75 parts water, more soluble in carbon dioxide water; insoluble in alcohol.

Dose: 0.5 Gm., or 7½ grains (in solution in carbon dioxide water).

LITHII CITRAS.—Lithium Citrate.

White powder, or crystals, soluble in 2 parts water.

Dose: 0.50 Gm., or 7½ grains (in effervescent form).

Elixir Lithii Citratis, N. F.

LITHII CITRAS EFFERVESCENS.—Granular Effervescent Lithium Citrate.—5 per cent. Lithium Citrate.

Dose: 8 Gm., or 120 grains, containing about 0.4 Gm., or 6 grains lithium citrate.

LITHII SALICYLAS.—Lithium Salicylate.

Grayish-white powder, very soluble in water and in alcohol.

Dose: 1 Gm., or 15 grains.

Elixir Lithii Salicylatis, N. F.

LOBELIA.—Leaves and tops of *Lobelia Inflata*..... 151

Dose: 0.5 Gm., or 7½ grains.

Fluidextractum Lobellæ, U. S.—Dose: 0.5 Cc., or 8 minims.

Tinctura Lobellæ, U. S.—Dose: Expectorant, 1 Cc., or 15 minims; emetic, 4 Cc., or 1 fluidram.

LOTIONES—LOTIONS (Washes).

Liquid mixtures, usually of insoluble medicinal substances, suspended in water, for external use. To be shaken before using.

Lotio Adstringens, N. F.—Warren's Styptic.—Mixture of nearly equal parts sulphuric acid, oil of turpentine and alcohol (Caution).

Lotio Flava, N. F.—Yellow Wash.

R Hydrargyri chloridi corrosivi.....gr. v. 13

Solve in aquæ bullientis.....fl. 3i 4

Liquoris calcis q. s.....fl. 3xxv 100

M. et Sig.: "Shake well before using." Externally.

Uses: Antiseptic, antisyphilitic, parasiticide.

Lotio Nigra, N. F.—Black Wash.

R Hydrargyri chloridi mitis.....gr. xlii 88
 Aquæ.....fl. 3i 4
 Liquoris calcis q. s.....fl. 3xxv 100
 M. et Sig.: "Shake well before using." Externally.
 Uses: Antiseptic, parasiticide.

Lotio Plumbi et Opii, N. F.—Lead and Opium Wash.

R Plumbi Acetatis.....gr. xxv 175
 Tincturæ opii.....m. xlviii 35
 Aquæ q. s.....fl. 3xxv 100
 M. et Sig.: "Shake well before using." Externally.
 Uses: Antiseptic, astringent, sedative.

LUPULINUM.—Trichomes from fruit Humulus Lupulus.

Dose: 0.5 Gm., or 7½ grains.

Fluidextractum Lupulinæ, U. S.—Dose: 0.5 Cc., or 8 minims.

Oleoresina Lupulinæ, U. S.—Dose: 0.2 Gm., or 3 grains.

LYCOPODIUM.—Spores of Lycopodium clavatum.

Use: As a dusting powder.

Magma Magnesiae, N. F.—Milk of Magnesia.

Mixture containing in most finely divided condition, suspended in water, 5 per cent. freshly precipitated magnesium hydroxide.

Dose: 8 Cc., or 2 fluidrams.

MAGNESII CARBONAS.—Magnesium Carbonate..... 127

Light, white masses, or bulky powder, practically insoluble in neutral liquids, readily decomposed by acids.

Dose: 3 Gm., or 45 grains.

Liquor Magnesii Citratis, U. S.

MAGNESII OXIDUM.—Magnesia (calcined).

White, very bulky and fine powder, practically insoluble in neutral liquids, soluble in dilute acids.

Dose: 2 Gm., or 30 grains.

Pulvis Rhei Compositus, U. S.—Dose: 2 Gm., or 30 grains.

Magma Magnesiae.—Milk of Magnesia, N. F.

MAGNESII OXIDUM PONDEROSUM.—Heavy Magnesia (calcined).—Husband's.

White, dense and very fine powder, insoluble.

Dose: 2 Gm., or 30 grains.

Pulvis Magnesiae et Rhei Anisatus, N. F.

MAGNESII SULPHAS.—Epsom Salt..... 132

Small, prismatic needles, or prisms, soluble in 0.85 part water, insoluble in alcohol.

Dose: 16 Gm., or 240 grains.

Infusum Sennæ Compositus, U. S.—Dose: 120 Cc., or 4 fluid ounces.

Liquor Magnesii Sulphatis Effervescens, N. F.

MAGNESII SULPHAS EFFERVESCENS.—Granular Effervescent

Magnesium Sulphate..... 132

Dose: 16 Gm., or 240 grains, containing 8 Gm., or 120 grains of magnesium sulphate; to be taken in a glassful of cold water.

MALTUM.—Grain of Barley, Hordeum distichon..... 123

Extractum Malti, U. S.

Fluidextractum, Malti, N. F.

MANGANI DIOXIDUM PRÆCIPITATUM.—(To replace the Man-

gani Dioxidum, U. S. '90).—80 per cent. pure.....101, 187

Heavy, black, fine, odorless powder, insoluble in water or alcohol.

Dose: 0.250 Gm., or 4 grains (pill form).

- MANGANI HYPOPHOSPHIS.**—Manganese Hypophosphite.
Pink, crystalline powder, soluble in 6.6 parts water.
Dose: 0.2 Gm., or 3 grains.
Syrupus Hypophosphitum Compositus, U. S.—Dose: 8 Cc., or 2 fluidrams.
- MANGANI SULPHAS.**—Manganese Sulphate.
Translucent, pale, rose-colored prisms, soluble in 0.7 part water.
Dose: 0.250 Gm., or 4 grains (pill form).
- MANNA.**—Concrete saccharine exudation of *Fraxinus Ornus*.
Infusum Sennæ Compositum, U. S.—Dose: 120 Cc., or 4 fluid ounces.
- MARRUBIUM.**—Leaves and tops *Marrubium vulgare*.
- MASSA FERRI CARBONATIS.**—Vallet's Mass.—Ferrous carbonate made into a mass with sugar and honey.
Dose: 0.250 Gm., or 4 grains (in pill form); superseded by pill of ferrous carbonate (Blaud's).
- MASSA HYDRARGYRI.**—Mass of Mercury.—Mass containing 33 per cent. mercury (metal).
Uses: Cathartic, alterative.
Dose: 0.250 Gm., or 4 grains.
Pilulæ ad Prandium, N. F.
Pilulæ Antidyspepticæ, N. F.
- MASTICHE.**—Mastic.—Concrete resinous exudation from *Pistacia lentiscus*.
Dose: 2 Gm., or 30 grains.
Pilulæ Aloes et Mastiches, U. S.
- MATICO.**—Leaves of *Piper angustifolium*.
Dose: 4 Gm., or 60 grains.
Fluidextractum Matico, U. S.—Dose: 4 Cc., or 1 fluidram.
- MATRICARIA.**—Flower heads of *Matricaria Chamomilla*.
- MEL.**—Honey.—Saccharine secretion from *Apis mellifera*.
- MEL DEPURATUM.**—Clarified Honey.
- MEL ROSÆ.**—Honey of Rose.—Fluidextract Rose, 12 per cent.
- MENTHA PIPERITA.**—Leaves and tops of *Mentha piperita*.
- MENTHA VIRIDIS.**—Leaves and tops of *Mentha spicata*.
- MENTHOL.**—Secondary alcohol from *Mentha piperita*.
Acicular crystals, or prisms, sparingly soluble in water, readily soluble in alcohol, ether, chloroform.
Uses: Antiseptic, analgesic, anesthetic, stimulant.
Dose: 0.065 Gm., or 1 grain.
Camphor Menthol, N. F.
- MERCURY.**.....126, 166
- METHYLIS SALICYLAS.**—Methyl Salicylate.—Artificial or synthetic oil of wintergreen.
An ester produced synthetically, identical chemically with the chief constituent of oil of gaultheria and oil of betula, for which it may be substituted for flavoring purposes, but not for internal uses; externally it is as effective and much less expensive. A liquid, sp. g. 1.18, sparingly soluble in water, readily soluble in other liquids.
- METHYLTHIONIÆ HYDROCHLORIDUM.**—Methylene Blue—Tetra Methylthionine Hydrochloride.—Derived from para-amido-dimethyl-aniline.
Dark green, crystalline powder, or crystals, readily soluble in water, less readily in alcohol.
Dose: 0.250 Gm., or 4 grains (in capsule).

MEZEREUM.—Bark of *Daphne Mezereum*.

Dose: 0.5 Gm., or 7½ grains.

Fluidextractum Mezerei, U. S.

Fluidextractum Sarsaparillæ Comp., U. S.

MISTURÆ—MIXTURES.

Liquids containing usually more or less insoluble substances, suspended in an aqueous vehicle consisting of sugar, mucilage, etc. With some exceptions they are unstable and should, therefore, be prepared extemporaneously.

Dosage is usually from one teaspoonful to one tablespoonful (4 to 16 Cc.).

MISTURA GLYCYRRHIZÆ COMPOSITA.—Brown Mixture..... 198

℞ Acaciæ	
Ext. glycyrrhizæ pur āā.....	gr. xlviii 3
Tincturæ opii camphoratæ.....	3iij 12
Vini antimoni.....	min. xc 6
Spiritus ætheris nitrosi.....	min. xlviii 3
Syrupi.....	min. lxxx 5
Mucilaginis acaciæ.....	3iiss 10
Aquæ q. s.....	3xxv 100

Dose: 8 Cc., or 2 fluidrams.

MORPHINA.—Principal alkaloid of *Opium*.....50, 150

White, shining, rhombic prisms, fine needles or crystalline powder, very sparingly soluble in water (3,300 parts), soluble in 100 parts lime water, 168 parts alcohol, sparingly in ether or chloroform.

Dose: 0.01 Gm., equal to 10 mg., or 1/5 grain.

Liquor Morphinæ Citratæ, N. F.—Dose: 0.3 Cc., or 5 minims.

MORPHINÆ ACETAS.—Morphine Acetate.

White, or yellowish-white, crystalline or amorphous powder, soluble in 2.25 parts water, 21.6 parts alcohol, 5.2 parts glycerine, sparingly in chloroform, insoluble in ether.

Incompatibles.—Alkalies and alkaline carbonates, tannic acid, tr. ferric chloride, potassium permanganate; salts of lead, mercury, iodine and bromine; cherry laurel.

Dose: 0.015 Gm., equal to 15 mg., or ¼ grain.

MORPHINÆ HYDROCHLORIDUM.—(M. Hydrochloras '90).—Muriate of Morphine.

White, glistening needles, micro-crystalline cubes, or white crystalline powder, soluble in 17.2 parts water, 42 parts alcohol, insoluble in ether and chloroform.

Dose: 0.015 Gm., equal to 15 mg., or ¼ grain.

Syrupus Pectoralis, N. F.—Dose: 4 Cc., or 1 fluidram.

MORPHINÆ SULPHAS.

White, feathery, acicular, silky crystals, or in cubes, soluble in 15.3 parts water, 465 parts alcohol, insoluble in ether and chloroform.

Dose: 0.015 Gm., equal to 15 mg., or ¼ grain.

MOSCHUS.—Secretion from *Moschus moschiferus*.

Dose: 0.250 Gm., or 4 grains.

Tinctura Moschi, U. S.—(5 per cent.).—Dose: 4 Cc., or 1 fluidram.

Enema is prepared from 0.6 Gm. (10 grs.) suspended in 30 Cc. (1 fluid ounce) mucilage acacia.

MUCILAGINES—MUCILAGES.

Liquid extracts of mucilaginous drugs, or solutions of gums in water.

MUCILAGO ACACIÆ.—Gum Arabic, 34 Gm., in 100 Cc.

Mucilago Chondri, N. F.—Chondrus, 3 Gm., in 100 Cc.—Irish Moss Jelly.

Mucilago Dextrini, N. F.—Dextrin, 33.5 Gm., in 100 Cc.

Mucilago Salep, N. F.—Salep, 1 Gm. in 100 Cc.

MUCILAGO SASSAFRAS MEDULLÆ.—Sassafras pith, 2 Gm. in 100 Cc.

MUCILAGO TRAGACANTHÆ.—Tragacanth, 6 Gm.; glycerine, 18 Gm. in 100 Cc.

MUCILAGO ULMI.—Elm (slippery), 6 Gm. in 100 Cc.

MUSTARD. 146

MYRISTICA.—Kernel of seed *Myristica fragrans*. 120

MYRRHA.—Gum resin from *Commiphora Myrrha*.

Dose: 0.5 Gm., or 7½ grains.

NAPHTHALENUM.—Naphthalene (Naphthalinum '90)—hydrocarbon from coal-tar, purified by crystallization.

Shining, transparent laminæ, insoluble in water, soluble in 13 parts alcohol, very soluble in ether, chloroform, fixed and volatile oils.

Dose: 0.125 Gm., or 2 grains (in capsule).

Pulvis Iodoformi Compositus, N. F.

NEO-SALVARSAN. 102, 229

NITROUS OXIDE. 33

NORMAL SALT SOLUTION. 70

NUX VOMICA.—Seed of *Strychnos Nux-vomica*.—Containing not less than 1.25 per cent strychnine. 64, 119

Dose: 0.065 Gm., or 1 grain.

Extractum Nucis Vomicae, U. S.—(Strychnine, 5 per cent.).

—Dose: 0.015 Gm., or ¼ grain.

Fluidextractum Nucis Vomicae, U. S.—(Strychnine, 1 per cent.).—Dose: 0.05 Cc., or 1 minim.

Tinctura Nucis Vomicae, U. S.—(Strychnine, 0.1 per cent.).

—Dose: 0.5 Cc., or 8 minims.

Elixir Phosphori et Nucis Vomicae, N. F.

Pilulae Aloes et Podophylli Compositae, N. F.

Pilulae Quadruplices, N. F.

OLEATA—OLEATES.

Compounds of Oleic Acid with certain bases, of liquid or semi-solid consistence, intended for external use or inunction. The oleates of the alkaloids: atropine, cocaine and veratrine, contain about one-half olive oil in place of oleic acid.

OLEATUM COCAINÆ.—Cocaine.—5 per cent.

Uses: Local anæsthetic.

OLEATUM HYDRAGYRI.—Yellow Mercuric Oxide, 25 per cent.

Uses: Antiperiodic, antiseptic.

OLEORESINÆ—OLEORESINS.

Oleoresins are mixtures of volatile oils and resins, either natural exudations such as Copaiba and Terebinthina, or extracted from oleoresinous drugs.

- OLEUM AMYGDALÆ AMARÆ.**—Oil of Bitter Almonds.—Should contain not less than 85 per cent. benzaldehyde, and not less than 2 per cent. nor more than 4 per cent. hydrocyanic acid.
Dose: 0.03 Cc., or $\frac{1}{2}$ minim. (Caution.)
Aqua Amygdalæ Amaræ, U. S.—Dose: 4 Cc., or 1 fluidram.
Spiritus Amygdalæ Amaræ, U. S.—Dose: 0.5 Cc., or 8 minims.
Syrupus Amygdalæ, U. S.—Dose: 4 Cc., or 1 fluidram.
- OLEUM AMYGDALÆ EXPRESSUM.**—Oil of Sweet Almond.
Dose: 30 Cc., or 1 fluid ounce.
Unguentum Aquæ Rosæ, U. S.
- OLEUM ADIPIS.**—Lard Oil.
- OLEUM ANISI.**—From Anise, or fruit of Star Anise.
Aquæ Anisi, U. S.—Spiritus Anisi, U. S.
- OLEUM AURANTII CORTICIS.**—From peel Citrus Aurantium.
Spiritus Aurantii Compositus, U. S.
- OLEUM BETULÆ.**—Oil Birch (Ol. Betulæ Volatile '90).—From the bark of the sweet birch (*Betula lenta*), practically identical with oil of gaultheria, consisting chiefly of methyl salicylate.
Dose: 1 Cc., or 15 minims (in gelatine capsule).
- OLEUM CADINUM.**—Oil of Cade.—Product of dry distillation of wood of *Juniperus oxycedrus*.
Unguentum Resorcini Compositum, N. F.
Unguentum Sulphuris Compositum, N. F.
- OLEUM CAJUPUTI.**—From leaves and twigs of *Melaleuca leucadendron*.—Should contain not less than 55 per cent. cineol.
Dose: 0.5 Cc., or 8 minims.
- OLEUM CARI.**—From fruit *Carum Carui*.—Caraway.
Dose: 0.2 Cc., or 3 minims.
- OLEUM CARYOPHYLLI.**—From *Eugenia aromatica*.—Cloves.—Should contain not less than 80 per cent. eugenol.
Dose: 0.2 Cc., or 3 minims.
- OLEUM CHENOPODII.**—From *C. anthelminticum*.—Wormseed.
Uses: Anthelmintic, vermifuge.
Dose: 0.2 Cc., or 3 minims.
- OLEUM CINNAMOMI.**—From *Cassia Cinnamon*.—Should contain not less than 75 per cent. cinnamic aldehyde.
Dose: 0.05 Cc., or 1 minim.
Aqua Cinnamomi, U. S.
Spiritus Cinnamomi, U. S.
- OLEUM CORIANDRI.**—From *Coriandrum sativum*.
Dose: 0.2 Cc., or 3 minims.
- OLEUM ERIGERONTIS.**—From *Erigeron canadensis*.—Fleabane.
Dose: 1 Cc., or 15 minims.
- OLEUM EUCALYPTI.**—From leaves of *Eucalyptus*.—Should contain not less than 50 per cent. cineol (eucalyptol).
Dose: 0.5 Cc., or 8 minims (in gelatine capsule).
- OLEUM FŒNICULI.**—From *Fœniculum vulgare*.—Fennel.
Dose: 0.2 Cc., or 3 minims.
Aqua Fœniculi, U. S.
Spiritus Fœniculi, U. S.

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OLEUM GAULTHERIÆ. —From <i>Gaultheria procumbens</i> .—Winter-green.—Consists chiefly of methyl salicylate.....	193
Dose: 1 Cc., or 15 minims (in gelatine capsule).	
Spiritus Gaultheriæ, U. S.	
Liquor Antisepticus, U. S.	
Liquor Antisepticus Alkalinus, N. F.	
OLEUM GOSSYPII SEMINIS. —Cottonseed Oil.....	193
Dose: 16 Cc., or 4 fluidrams.	
Linimentum Ammonia, U. S.	
OLEUM HEDEOMÆ. —From <i>Hedoma pulegioides</i> .—Pennyroyal.	
Dose: 0.2 Cc., or 3 minims.	
OLEUM JUNIPERI. —From <i>Juniperus communis</i>	156
Dose: 0.2 Cc., or 3 minims.	
Spiritus Juniperi, U. S.	
Spiritus Juniperi Comp., U. S.	
OLEUM LIMONIS. —From <i>Citrus Limonum</i> .—Should yield not less than 4 per cent. aldehyde (citral).	
OLEUM LINI. —Linseed Oil.	
Dose: 30 Cc., or 1 fluid ounce.	
Linimentum Calcis, U. S.	
Sapo Mollis, U. S.	
OLEUM MENTHÆ PIPERITÆ. —From Peppermint.—Should yield not less than 8 per cent. ester and not less than 50 per cent. total menthol.	
Dose: 0.2 Cc., or 3 minims.	
Aqua Menthæ Piperitæ, U. S.	
Spiritus Menthæ Piperitæ, U. S.	
Liquor Antisepticus, U. S.	
Liquor Antisepticus Alkalinus, N. F.	
OLEUM MENTHÆ VIRIDIS. —From <i>Mentha spicata</i> .—Spear-mint.	
Dose: 0.2 Cc., or 3 minims.	
OLEUM MORRHUÆ. —Cod Liver Oil.....	173
Dose: 16 Cc., or 4 fluidrams.	
Emulsum Olei Morrhuæ, U. S.—Dose: 8 Cc., or 2 fluidrams.	
Emulsum Olei Morrhuæ cum Hypophosphitibus, U. S.	
Emulsum Olei Morrhuæ cum Calcii Lactophosphate, N. F.	
Emulsum Olei Morrhuæ cum Calcii Phosphate, N. F.	
Emulsum Olei Morrhuæ cum Extracto Malti, N. F.	
Emulsum Olei Morrhuæ cum Pruno Virginiana, N. F.	
OLEUM MYRISTICÆ. —From <i>Myristica fragrans</i> .—Nutmeg.	
Dose: 0.2 Cc., or 3 minims.....	
OLEUM OLIVÆ. —Olive Oil.	
Dose: 30 Cc., or 1 fluid ounce.	
Unguentum Diachylon, U. S.	
OLEUM PICIS LIQUIDÆ. —From <i>Picis Liquida</i> .—Tar.	
Dose: 0.2 Cc., or 3 minims.	
Mistura Olei Picis, N. F.	
Unguentum Picis Compositum, N. F.	
OLEUM PIMENTÆ. —From <i>Pimenta officinalis</i> .—Allspice.—Should contain not less than 65 per cent. eugenol.	
Dose: 0.2 Cc., or 3 minims.	
OLEUM RICINI. —Castor Oil.....	126
Dose: 16 Cc., or 4 fluidrams.	
Emulsum Olei Ricini, N. F.	

- OLEUM ROSÆ.**—From *Rosa damascena*.—Should have a saponification value of not less than 10 nor more than 17.
- OLEUM ROSMARINI.**—From *Rosmarinus officinalis*.—Should contain not less than 15 per cent. total borneol.
- OLEUM SABINÆ.**—From *Juniperus sabinæ*.
Dose: 0.05 Cc., or 1 minim.
- OLEUM SANTALI.**—From *Santalum album*.—Should contain not less than 90 per cent. alcohols (santalol)..... 156
Dose: 0.5 Cc., or 8 minims.
- OLEUM SASSAFRAS.**—From *Sassafras variifolium*.
Dose: 0.2 Cc., or 3 minims.
- OLEUM SINAPIS VOLATILE.**—From *Brassica nigra*.—Should yield not less than 92 per cent. allyl isothiocyanate..... 193
Uses: Rubefacient, vesicant.
Dose: 0.008 Cc., or $\frac{1}{4}$ minim (rarely internally). (Caution.)
- OLEUM THEOBROMATIS.**—Cacao Butter.—Solid, melting at body temperature, 30-35 C.
- OLEUM TIGLII.**—Croton Oil..... 137
Dose: 0.05 Cc., or 1 minim.
Linimentum Tiglii, N. F.
Linimentum Tiglii Compositum, N. F.
- Oleum Carbolatum, N. F.**—Carbolized Oil.—Phenol (carbolic acid), 5 per cent. in cottonseed oil.
- Olea Volatilia**—Volatile Oils (Essential)..... 199
- OLEUM TEREBINTHINÆ.**—From *Terebinthina*.
- OLEUM TEREBINTHINÆ RECTIFICATUM.**—Rectified oil of turpentine.
Dose: 1 Cc., or 15 minims.
Emulsum Terebinthinæ, U. S.—Dose: 4 Cc., or 1 fluidram.
- OLEUM THYMI.**—From *Thymus vulgaris*.—Should contain not less than 20 per cent. phenols (thymol).
Dose: 0.2 Cc., or 3 minims.
Liquor Antisepticus, U. S.
- OLEUM ÆTHERUM.**—Ethereal Oil.—Liquid; equal volumes of heavy oil of wine and ether.
Spiritus Ætheris Compositus, U. S.—Dose: 4 Cc., or 1 fluidram.
- OPII PULVIS.**—12 to 12.5 per cent. Morphine.
Dose: 0.65 Gm., or 1 grain.
Acetum Opii, U. S.—(10 per cent.).—Dose: 0.5 Cc., or 8 minims.
Vinum Opii, U. S.—(10 per cent.).—Dose: 0.5 Cc., or 8 minims.
Tincture Opii, U. S.—(10 per cent.).—Dose: 0.5 Cc., or 8 minims.
Tinctura Opii Deodorata, U. S.—(10 per cent.).—Dose: 0.5 Cc., or 8 minims.
Tinctura Ipecacuanhæ et Opii, U. S.—(Each 10 per cent.).—Dose: 0.5 Cc., or 8 minims.
Tinctura Opii Camphorata, U. S.—(0.4 per cent. opium).—Dose: 8 Cc., or 2 fluidrams.
Extractum Opii, U. S.—(20 per cent. morphine).—Dose: 0.03 Gm., or $\frac{1}{2}$ grain.

- Emplastrum Opii, U. S.—(6 per cent. extract opium).
 Pilulæ Opii, U. S.—(0.06 Gm. in each).
 Trochisci Glycyrrhizæ et Opii, U. S.—(5 mg. in each).
 Pulvis Ipecacuanhæ et Opii, U. S.—(10 per cent.).—Dose:
 0.5 Gm., or 7½ grains.
 Pilulæ Opii et Camphoræ, N. F.
 Pilulæ Opii et Plumbi, N. F.
 Lotio Plumbi et Opii, N. F.
 Mistura Sassafras et Opii, N. F.
 Pulvis Cretæ Aromaticus cum Opio, N. F.
 Pulvis Kino Compositus, N. F.
 Misturæ contra Diarrhœam, N. F.
 Linimentum Opii Compositum, N. F.
 Mistura Camphoræ Acida, N. F.
 Mistura Carminativa, N. F.
- OPIUM.**—Concrete exudation *Papaver somniferum*.—Yielding in its normal moist condition not less than 9 per cent. crystallized morphine. 48, 150
- OPIUM DEODORATUM.**—Denarcotized Opium.—Powdered opium deprived of certain odorous principles by extraction with benzoin and mixed with milk-sugar so as to represent 12 to 12.5 per cent. morphine.
Uses: Same as Opium pulv., to which it is sometimes preferred as producing no untoward effects.
Dose: 0.065 Gm., or 1 grain.
- OPIUM GRANULATUM.**—12 to 12.5 per cent. Morphine.
- OXYGEN.** 156
- PANCREATINUM.**—Mixture of enzymes obtained from the fresh pancreas of the hog or the ox, consisting principally of amyl-opsin, myopsin, trypsin and steapsin, and capable of converting not less than 25 times its weight of starch into water-soluble substance (dextrose). It digests albuminoids and in neutral, faintly alkaline or acid media converts starch. Its power is impaired when in solution with pepsin, and preparations of pancreatin and pepsin, like the two last-mentioned below, are practically inert. 123
 Cream-colored powder, slowly but not completely soluble in water, insoluble in alcohol.
Dose: 0.5 Gm., or 7½ grains.
 Pulvis Pancreaticus Compositus, N. F.—(Peptonizing powder).
 Pulvis Pepsini Compositus, N. F.
 Elixir Digestivum Compositum, N. F.
- PAPAIN.** 124
- PARAFFINUM.**—Paraffin.
- PARALDEHYDUM.**—A polymer of Acetaldehyde.
 Colorless liquid, soluble in 8 parts water, miscible in all proportions with alcohol, ether, fixed volatile oils.
Dose: 2 Cc., or 30 minims.
 Elixir Paraldehydi, N. F.
- PAREIRA.**—Root of *Chondodendrum tomentosum*.
Uses: Alterative, diuretic.
Dose: 2 Gm., or 30 grains.
 Fluidextractum Pareiræ, U. S.—Dose: 2 Cc., or 30 minims.

- Pasta Dextrinata, N. F.**—"Dextrinated Paste."—Dextrin, 10; glycerine, 10; distilled water, a sufficient quantity to make 30 parts.
- Note.—This is a general vehicle for various medications.
- PELLETIERINÆ TANNAS.**—Pelletierine tannate.—Mixture of four alkaloids from *Punica Granatum*..... 118
- Light yellow powder, soluble in 235 parts water, 12.6 parts alcohol, 300 parts ether.
- Dose: 0.250 Gm., or 4 grains (in capsule).
- PEPO.**—Seed of *Cucurbita Pepo*..... 118
- Uses: Teniafuge, emulsion (not strained).
- Dose: 30 Gm., or 1 ounce.
- PEPSINUM.**—Pepsin.—Proteolytic ferment or enzyme from the hog, capable of digesting not less than 3,000 times its weight of freshly coagulated and disintegrated egg albumen. Pepsin in solution is incompatible with alkalies and pancreatin, which destroy its activity; alcohol above 25 per cent. also impairs its activity. It is precipitated by salts of many of the heavy metals (mercury), tannic and gallic acids, and by alcohol (50 per cent).....122, 270
- White, or yellowish, scales or grains, or white or cream-colored powder, soluble, or almost entirely soluble, in about 50 parts water, more soluble in water weakly acidulated with HCl, insoluble in alcohol or ether.
- Dose: 0.250 Gm., or 4 grains.
- The following preparation will be found as satisfactory as any, especially when a vehicle is desired to make medicines more acceptable to the stomach:
- Essentia Pepsini, N. F.—Dose: 8 Cc., or 2 fluidrams.
- PETROLATUM.**—Soft Paraffin—Vaselin.—Mixture of hydrocarbons from petroleum. Melting point between 45 and 48 C., intended to replace petrolatum, molle (soft), and P. spissum (hard) of the U. S. P. '90..... 196
- PETROLATUM ALBUM.**—White Petrolatum.
- PETROLATUM LIQUIDUM.**—Liquid Petrolatum.
- Colorless, or slightly yellowish opalescent liquid, s. g., 0.87 to 0.94, insoluble in water or alcohol nor miscible with watery mixtures unless containing soap; soluble in the other common liquids and a solvent for phenol, volatile oils and derivatives such as camphor, thymol, salicylic acid, etc.
- Dose: one to four drams.
- Petrolatum Saponatum Liquidum, N. F.**—Liquid Petrox.—Petrolatum saponified with ammonium oleate.
- Uses: A penetrating vehicle for medicinal agents, phenol, iodine, iodoform, salicylic acid, etc. Systemic effects said to be derived through inunction.
- PHENOL.**—Acidum Carbolicum (U. S. '90).—Hydroxybenzene from coal tar, by fractional distillation, purification and crystallization. Should contain not less than 96 per cent. absolute phenol.....116, 204
- Colorless crystals, or crystalline mass, sometimes acquiring a reddish tint, readily fusing and inflammable, soluble in 19.6 parts water, very soluble in all other solvents except petroleum-benzin. The addition of 8 per cent. water to the crystals forms a permanent solution.
- Dose: 0.065 Gm., or 1 grain (pill form); rarely internally.
- Glyceritum Phenolis, U. S.**—20 per cent.
- Unguentum Phenolis, U. S.**—3 per cent.
- Liquor Sodii Boratis Compositus, N. F.**
- Acidum Carbolicum Iodatum, N. F.**
- Liquor Sodii Carbolatus, N. F.**

- PHENOL LIQUEFACTUM.**—Liquefied Phenol.—Liquid containing 86.4 per cent. by weight of absolute phenol, or 90 per cent. official phenol; 10 parts by weight represents 9 parts phenol, U. S.; a convenient liquid form for general use.
Dose: 0.05 Cc., or 1 minim.
- PHENOLPHTHALEIN.**.....131, 283
- PHENYLIS SALICYLAS.**—Salol (U. S. '90).—The salicylic ester of phenol. 115
White crystalline powder, practically insoluble in water (2.333 parts), soluble in 5 parts alcohol, very soluble in ether, chloroform, fixed and volatile oils.
Dose: 0.50 Gm., or 7½ grains, in gelatine capsule, cachets (powder form).
Also used for coating enteric pills by dipping the pills in the melted salol.
- PHOSPHORUS.**—Should contain 99.5 per cent. P. 172
Translucent, yellowish solid, of a waxy luster, practically insoluble in water, soluble in 350 parts absolute alcohol, 80 parts absolute ether, in 50 parts of any fixed oil and 25 parts chloroform; very soluble in carbon disulphide, the solution being dangerously inflammable.
Dose: 0.0005 Gm., equal to 0.5 mg., or 1/128 grain.
Pilula Phosphori, U. S.—(0.6 mg., or 1/100 gr.) in each.
Oleum Phosphoratum, N. F.
- PHYSOSTIGMA.**—Seed from *Physostigma venenosum*.—Should contain not less than 0.15 per cent. alkaloids soluble in ether.... 129
Dose: 0.1 Gm., or 1½ grains.
Tinctura Physostigmati, U. S.—Dose: 1 Cc., or 15 minims.
Extractum Physostigmati, U. S.—Dose: 8 mg., or ¼ grain.
- PHYSOSTIGMINÆ SALICYLAS.**—"Eserine" salicylate.
Faintly yellowish acicular or columnar crystals, soluble in 72.6 parts water, 12.7 parts alcohol, 175 parts ether, and 8.6 parts chloroform.
Dose: 0.001 Gm., equal to 1 mg., or 1/64 grain (in granule).
- PHYSOSTIGMINÆ SULPHAS.**—"Eserine" Sulphate.
Yellowish-white micro-crystalline powder, very soluble in water, alcohol and chloroform, practically insoluble in ether (1200).
Dose: 0.001 Gm., equal to 1 mg., or 1/64 grain.
- PHYTOLACCA.**—Root of *Phytolacca decandra*.
Dose: Emetic, 1 Gm., or 15 grains; alterative, 0.125 Gm., or 2 grains.
Fluidextractum Phytolaccæ, U. S.—Dose: Alterative, 0.1 Cc. (1½ minims); emetic 1 Cc. (15 minims).
- PILOCARPINÆ HYDROCHLORIDUM.**—P. Hydrochloras (U. S. '90).
White transparent crystals, very soluble in water (0.3 part) and in alcohol (2.3 parts).
Dose: 0.01 Gm., equal to 10 mg., or 1/5 grain.
- PILOCARPINÆ NITRAS.**—Pilocarpine Nitrate.
White shining crystals, soluble in 4 parts water, 60 parts alcohol, insoluble in ether and chloroform.
Dose: 0.01 Gm., equal to 10 mg., or 1/5 grain.
- PILOCARPUS.**—Leaflets of *P. Jaborandi* or *P. Microphyllus*.—Should yield not less than 0.5 per cent. alkaloids..... 160
Dose: 2 Gm., or 30 grains.
Fluidextractum Pilocarpi, U. S.—Dose: 2 Cc., or 30 minims.
Elixir Pilocarpi, N. F.
Pilocarpine (active principle).—Dose: 1/16 of a grain.

PILULA ASAFŒTIDÆ.

R Asafœtidæ.	gr. iii	20
Saponis pulv.		
Dose: 2.		

PILULA CATHARTICA COMP.

R Ext. colocynthidis comp.	gr. ½	08
Hydrargyri chloridi mitis.	gr. i	06
Resinæ jalapæ.	gr. ½	02
Cambogiæ pulv.	gr. ¼	015
Dose: 2.		

PILULA CATHARTICA VEGETABILIS.

R Ext. colocynthidis comp.	gr. i	06
Extracti hyoscyami.	gr. ss	03
Resinæ jalapæ.	gr. ½	02
Extracti leptandræ		
Resinæ podophylli, āā.	gr. ¼	015
Olei menthæ piperitæ.	gr. ¼	008
Dose: 2.		

Pilula Colocynthidis et Podophylli, N. F.

R Ext. colocynth comp.	gr. liss	16
Resinæ podophylli	gr. ¼	016

PILULA FERRI CARBONATIS.—"Blaud's Pill"—Ferrous Carbonate.—0.06 Gm., or 1 grain. By reaction on ferrous sulphate with alkalis, ferrous carbonate is formed; protected against oxidation by sugar and excipients. Should be prepared as wanted.

Uses: Chalybeate tonic, hematinic.

Dose: 2.

PILULA LAXATIVA COMP.

R Aloini.	gr. ¼	013
Strychninæ.	gr. 1/128	0005
Ext. belladonnæ foliorum.	gr. ½	008
Ipecacuanhæ pulv.	gr. ⅓	004
Glycyrrhizæ pulv.	gr. ¾	046
Dose: 2.		

PILULA PODOPHYLLI, BELLADONNÆ ET CAPSICI.

R Resinæ podophylli.	gr. ¼	016
Ext. belladonnæ foliorum.	gr. ½	008
Capsici pulv.	gr. ss	032
Sacchari lactis.	gr. i	065
Acaciæ pulv.	gr. ¼	016
Dose: 1.		

PILULA RHEI COMPOSITA.

R Rhei pulv.	gr. ii	13
Aloes.	gr. lss	10
Myrrhæ.	gr. i	06
Olei menthæ pip.	gr. ⅓	005
Dose: 2.		

PIMENTA.—Fruit *Pimenta officinalis*.

PIPER.—Fruit *Piper nigræ*.

PIPERAZINE. 143, 284

PIPERINA.—Principle obtained from Pepper.

Yellowish white crystals, insoluble in water, soluble in 15 parts alcohol.

Uses: Antiperiodic, tonic.

Dose: 0.2 Gm., or 3 grains (in pills).

	Page
PITUITRIN. —An extract from the posterior lobe of the pituitary gland.	70
Dose: 5 to 10 minims, hypodermically.	
PIX LIQUIDA. —Tar (Pine tar)	155
Semi-liquid, viscid, blackish-brown product, soluble in alcohol, fixed or volatile oils, very sparingly soluble in water.	
Dose: 0.5 Gm., or 7½ grains.	
Syrupus Picis Liquidæ, U. S.—Dose: 4 Cc., or 1 fluidram.	
Liquor Picis Alkalinus, N. F.	
Vinum Picis, N. F.	
Glyceritum Picis Liquidæ, N. F.	
Elixir Picis Compositum, N. F.	
Mistura Olei Picis, N. F.	
Unguentum Picis, U. S.	
Unguentum Picis Compositum, N. F.	

PLUMBUM—LEAD—Pb.

The soluble compounds of Lead are all poisonous. Antidote: Any soluble alkali sulphate, preferably magnesium sulphate, which by interaction forms the insoluble lead sulphate; subsequently evacuation by emetic.

PLUMBI ACETAS. —Sugar of Lead.	107
Heavy white crystalline masses, or granular crystals, soluble in 2 parts water, 30 parts alcohol.	
Dose: 0.065 Gm., or 1 grain.	
Liquor Plumbi Subacetatis, U. S.	
Liquor Plumbi Subacetatis Dilutus, U. S.	
Ceratum Plumbi Subacetatis, U. S.	
Emplastrum Plumbi, U. S.	
Pilula Plumbi et Opii, N. F.	
Lotio Plumbi et Opii, N. F.	
PLUMBI IODIDUM. —Lead iodide.	
Heavy bright-yellow powder, practically insoluble in water or other neutral liquids.	
Unguentum Plumbi Iodidi, N. F.—(10 per cent.).	
PLUMBI NITRAS. —Lead nitrate.	
White opaque crystals, very soluble in water.	
PLUMBI OXIDUM. —Litharge.	
Heavy salmon-colored powder, insoluble in water and neutral liquids.	
PODOPHYLLUM. —Rhizome of <i>Podophyllum peltatum</i>	129
Dose: 0.5 Gm., or 7½ grains.	
Fluidextractum Podophylli, U. S.—Dose: 0.5 Cc., or 8 minims.	
Resina Podophylli, U. S.—Dose: Purgative, 0.015 Gm., or ¼ grain; laxative, 0.005 Gm., or 1/10 grain.	
Pilula Cathartica Vegetabilis, U. S.	
Pilula Podophylli, Belladonnæ et Capsici, U. S.	
Pilula Aloes et Podophylli Composita, N. F.	

POTASSIUM—KALIUM—K.

The salts of potassium are all soluble in water and, with some exceptions, insoluble in alcohol. The acid tartrate of potassium (cream of tartar) is sparingly soluble in water (in 200 parts); the chlorate and permanganate in 16 parts; the remaining salts are still more soluble, some even being deliquescent.

cent, e. g., the acetate. The potassium salts, however, are somewhat less soluble in water than the respective sodium salts. The alkalies are represented by the hydroxide, carbonate and bicarbonate, their relative strength being in the order named.

POTASSII ACETAS.—Potassium Acetate.

White crystalline powder, deliquescent, soluble in 0.4 part water.

POTASSII BICARBONAS.—Potassium Bicarbonate.— KHCO_3 .

Transparent prisms or granular powder soluble in 3 parts water.

Dose: 2 Gm., or 30 grains.

Liquor Potassii Citratis.—Dose: 16 Cc., or 4 fluidrams.

Liquor Antisepticus Alkalinus, N. F.

POTASSII BITARTRAS.—Cream of Tartar.

White crystalline powder, soluble in 200 parts water.

Dose: 2 Gm., or 30 grains (diuretic).

Pulvis Jalapæ Compositus, U. S.—Dose: 2 Gm., or 30 grains.

POTASSII BROMIDUM.—Potassium Bromide—KBr.

White cubical crystals or granular powder, soluble in 1.5 parts water.

Dose: 1 Gm., or 15 grains.

In liquid mixtures with salts of alkaloids chemical interaction occurs, with the formation of bromide of the alkaloid, which, being insoluble in watery liquids, precipitates, thus making the preparation dangerous to use. This may be prevented by using aromatic elixir or other alcoholic liquid for a vehicle, since the alkaloidal bromide is soluble in 25 per cent. alcohol, thus:

Elixir Potassii Bromidi, N. F.

Syrupus Bromidorum, N. F.

Mistura Chlorali et Potassii Bromidi Composita, N. F.

Pulvis Potassii Bromidi Effervescens, N. F.

Pulvis Potassii Bromidi Effervescens cum Caffaina, N. F.

POTASSII CARBONAS.—Salts Tartar— K_2CO_3 .

White granular powder, soluble in less than its weight of water.

Dose: 1 Gm., or 15 grains (largely diluted).

Syrupus Rhei, U. S.

Syrupus Rhei Aromaticus, U. S.

POTASSII CHLORAS.—Potassium Chlorate— KClO_3 202

Tabular plates, or white granular powder, soluble in 16 parts water, in 1.7 parts boiling water, insoluble in alcohol, etc.

Caution.—Should not be triturated with sugar or other organic substances nor with sulphur or other easily oxidizable substances. Potassium chloride should not be rubbed up with tannic acid, as the mixture will explode. Chlorate of potassium and ammonium may ignite.

Mixture should be effected by means of spatula without the use of a mortar.

Dose: 0.25 Gm., or 4 grains.

Trochisci Potassii Chloratis, U. S.

POTASSII CITRAS.—Potassium Citrate.....140, 141, 150

Prismatic crystals, or white granular powder, soluble in 0.5 parts water.

Dose: 1 Gm., or 15 grains.

Liquor Potassii Citratis, U. S.—Dose: 16 Cc., or 4 fluidrams.

POTASSII CITRAS EFFERVESCENS.—Granular Salt.—Effervescent mixture containing 20 per cent. potassium citrate.

Dose: 4 Gm., or 60 grains, containing about 0.8 Gm., or 12 grains potassium citrate.

POTASSII CYANIDUM.—Potassium Cyanide—KCN.

White opaque pieces, or white granular powder, very deliquescent, soluble in 2 parts water. Very poisonous; must be handled with great care.

Dose: 0.01 Gm., equal to 10 mg., or 1/5 grain, in dilute solution, water or syrup.

POTASSII DICHROMAS.—Potassium Bichromate.

Orange-red prisms, or tabular crystals, soluble in 9 parts water.

Dose: 0.01 Gm., equal to 10 mg., or 1/5 grain (rarely).

POTASSII FERROCYANIDUM.

Yellow tabular crystals, soluble in 4 parts water.

Dose: 0.5 Gm., or 7½ grains (rarely).

POTASSII HYDROXIDUM.—Potassa (U. S. '90).—Caustic Potash—KOH.—Should contain not less than 85 per cent. KOH.

Fused masses or in pencils, soluble in 0.4 parts water.

Caution.—In handling, to avoid caustic effect, lubricate the hands thoroughly with petrolatum.

Liquor Potassii Hydroxidi, U. S. (Liquor Potassæ) KOH 5 per cent.

POTASSII HYPOPHOSPHIS.—KPH₂O₂.

White opaque plates or crystalline masses, soluble in 0.5 parts water, in 7 parts alcohol.

Dose: 0.5 Gm., or 7½ grains.

Syrupus Hypophosphitum, U. S.—Dose: 8 Cc., or 2 fluidrams.

Syrupus Hypophosphitum Compositus, U. S.—Dose: 8 Cc.

See also Elixir and Syrupus, N. F.

POTASSII IODIDUM.—Iodide of Potassium—KI..... 169

Opaque white cubical crystals or white granular powder, soluble in 0.7 parts water, 12 parts alcohol, 2.5 parts glycerine.

Incompatible with alkalies, alkaloidal salts, tannic acid, salts of mercury (calomel), chloral hydrate, potassium chlorate, acids.

Dose: 0.5 Gm., or 7½ grains (only in solution).

Liquor Iodi Compositus, U. S.—Dose: 0.2 Cc., or 3 minims.

Unguentum Potassii Iodidi, U. S.—(10 per cent.).

Liquor Hydrargyri et Potassii Iodidi, N. F.

POTASSII NITRAS.—Saltpetre.—KNO₃.

Prisms or white crystalline powder, soluble in 3.6 parts water.

Dose: 0.5 Gm., or 7½ grains (largely diluted).

POTASSII PERMANGANAS...... 186

Dark-purple colored prisms, soluble in 15 parts water.

Incompatible with organic substances; for pills should be triturated with kaolin and massed with petrolatum.

Dose: 0.065 Gm., or 1 grain (pill form). In solution, 1 to 500, converts phosphorus into phosphoric acid.

POTASSII SULPHAS.—Potassium Sulphate—K₂SO₄.

Prisms or white powder, soluble in 9 parts water.

Dose: 2 Gm., or 30 grains.

POTASSII ET SODII TARTRAS.—Rochelle Salt..... 132

Transparent prisms, or white powder, soluble in 1.2 parts water.

Dose: 8 Gm., or 120 grains.

Pulvis Effervescens Compositus, U. S.—(Seidlitz Powder).

- PROTARGOL.**—A preparation of silver, used in 1 to 10 per cent. solution. 287
- PRUNUM.**—Dried fruit of the *Prunus domestica*.
- PRUNUS VIRGINIANA.**—Wild Cherry.—Bark of *Prunus serotina*.
Dose: 2 Gm., or 30 grains.
Fluidextractum Pruni Virginianæ, U. S.—**Dose:** 2 Cc., or 30 minims.
Syrupus Pruni Virginianæ, U. S.—**Dose:** 4 Cc., or 1 fluidram.
Syrupus Pini Strobi Compositus, N. F.
Vinum Pruni Virginianæ, N. F.
Vinum Pruni Virginianæ Ferratum, N. F.

Pulveres Effervescentes—Effervescent Powders.

Formula A, Fine Powder.	
Medicinal agent, in fine powder.....	50 parts
Saccharated sodium bicarbonate (N. F.).....	475 parts
Saccharated tartaric acid (N. F.).....	475 parts
Formula B, Granular Powder.	
Medicinal agent, in fine powder.....	50 parts
Saccharated sodium bicarbonate (N. F.).....	475 parts
Saccharated tartaric acid (N. F.).....	237.5 parts
Saccharated citric acid (N. F.).....	237.5 parts

From these general formulas effervescent powders or salts may easily be prepared so as to represent about 0.3 Gm. (5 grs.) in a heaped teaspoonful, 6 Gm. (90 grs.).

- Pulvis Antisepticus**, N. F.—(Soluble Antiseptic Powder).—Mixture of phenolis (carbolic acid), eucalyptolis, mentholis, thymolis, ana, 0.1 per cent.; acidi salicylici, 0.5 per cent.; zinci sulphatis, 12.5 per cent.; acidi borici pulv., 86.6 per cent. 198
Uses: Antiseptic; dusting powder, or in 5 per cent. solution. Similar in composition to various antiseptic powders of more or less secret character sold under trade names.
- PULVIS AROMATICUS.**—Mixture of: Saigon cinnamon, 35; ginger, 35; cardamom 15, and myristica, 15 parts. 198
Dose: 1 Gm., or 15 grains.
Fluidextractum Aromaticum, U. S.—A fluid form for liquid mixtures.
- Pulvis Cretæ Aromaticus**, N. F. (B. P.).—Mixture of cinnamomi, 8; croci, 6; myristicæ, 6; caryophylli, 3; cardamomi, 2; cretæ preparatæ, 23; sacchari, 52 parts.
Dose: 2 Gm., or 30 grains.
- Pulvis Cretæ Aromaticus cum Opio**, N. F.—(B. P.).—**Pulvis cretæ aromaticus** with 2.5 per cent. opii pulvis.
Dose: 1 Gm., or 15 grains, contains 0.02 (¼ gr.) opium pulv.
- PULVIS CRETÆ COMPOSITUS.**—Mixture of: Cretæ preparatæ, 30; acaciæ pulv., 20; sacchari pulv., 50 parts, for preparing Mistura Cretæ, which see.
- PULVIS EFFERVESCENS COMPOSITUS.**—Seldlitz Powders. 132
- PULVIS GLYCYRRHIZÆ COMPOSITUS.**—Pectoral Powder.
R Sennæ pulv. gr. lxxx 5
 Glycyrrhizæ pulv. gr. C 6
 Sulphuris loti gr. xxxv 2
 Olei fœniculi m. ii 1
 Sacchari pulv. gr. CCxl 15 M
Dose: 4 Gm., or 60 grains (in milk).

PULVIS IPECACUANHÆ ET OPII.—Dover's Powder.—Mixture of opii pulv., 1 grain (0.065); ipecac. pulv., 1 grain (0.065); sacchari lacti, 8 grains (0.5). See Tinct. Ipecacuanhæ et Opii, U. S., for liquid form.

Dose: 0.5 Gm., or $7\frac{1}{2}$ grains.

PULVIS JALAPÆ COMPOSITUS.—Compound Powder of Jalap.—Mixture of jalapæ pulv., 35; potassii bitartratis, 65 parts.

Dose: 2 Gm., or 30 grains.

Pulvis Pancreaticus Compositus, N. F.—Peptonizing Powder.—Pancreatin (U. S. P.), 20; sodii bicarbonatis, 80 parts.

Of this mixture 1.5 Gm. (35 grains) will peptonize 500 Cc. (1 pint) fresh cow's milk by the following method: To the powder in 125 Cc. (4 fl. ozs.) tepid water contained in a flask, is added the milk previously warmed to 38 C. (104 F.) and the mixture maintained at this temperature for 30 minutes, then put in a cold place; it should not be used after being kept more than 24 hours. For preparation of "Humanized Milk" see Pulvis Pro Lacte Humanisato.

Pulvis Potassii Bromidi Effervescens, N. F.

Dose: 6 Gm., or 90 grains (a heaped teaspoonful), representing about 0.65 Gm. (10 grains) potassium bromide.

Pulvis Potassii Bromidi Effervescens cum Caffeina, N. F.

Dose: 6 Gm., or 90 grains (a heaped teaspoonful) representing about 0.65 Gm. (10 gr.) potassium bromide and 0.065 Gm. (1 gr.) caffeine. Similar to a well-known proprietary article.

Pulvis Rhei et Magnesiae Anisatus, N. F.—Compound Anise Powder.—Rhei pulv., 3.5 Gm. (55 grs.); magnesii oxidi ponderosa, 6.5 Gm. (100 grs.); olei anisi, 0.8 Cc. (12 minims).

Uses: Antacid, carminative, laxative.

Dose: For infants, 0.3 Gm., or 5 grains.

Pulvis Salis Carolini Factitii Effervescens, N. F.—Effervescent Artificial Carlsbad Salt..... 132

Dose: 6 Gm., or 90 grains (a heaped teaspoonful), in 200 Cc. (6 fl. oz.) water, representing an equal volume of Carlsbad water (Sprudel).

PYRETHRUM.—Root of *Anacyclus Pyrethrum*.

Dose: 2 Gm., or 30 grains.

Tinctura Pyrethri, U. S.

PYROGALLOL.—Pyrogallic Acid.—Triatomic Phenol obtained by heating gallic acid.

Light white lamina, or fine needles, very soluble in water, alcohol and ether.

PYROXYLINUM.—Soluble Guncotton.—Chiefly tetranitrate of cellulose; for preparing collodions.

QUASSIA.—Wood of *Picrasma excelsa*, or of *Quassia amara*...118, 119

Dose: 0.5 Gm., or $7\frac{1}{2}$ grains.

Fluidextractum Quassiae, U. S.—Dose: 0.5 Gm., or 8 minims.

Extractum Quassiae, U. S.—Dose: 0.065 Gm., or 1 grain.

Tinctura Quassiae, U. S.—Dose: 2 Cc., or 30 minims.

QUERCUS.—Bark of *Quercus alba*.—White Oak.

Dose: 1 Gm., or 15 grains.

Fluidextractum Quercus.—Dose: 1 Cc., or 15 minims.

QUILLAJA.—Bark of *Quillaja Saponaria*.

Dose: Not given internally

Fluidextractum Quillajæ, U. S.

Tinctura Quillajæ, U. S.

QUININA.—Alkaloid from Cinchona.....163, 288

White, flaky micro-crystalline powder, practically insoluble in water (as are most alkaloids), in 1,150 parts; readily soluble in alcohol (0.6), chloroform (1.9) and ether (4.5), which distinguishes it from the other alkaloids, cinchonine and cinchonidine.

Dose: 0.25 Gm., or 4 grains.

Oleatum Quininae, U. S.—(25 per cent.).

Syrupus Hyposphosphitum Compositus, U. S.

Glyceritum Ferri Quininae et Strychninae Phosphatum, U.

S.—Dose: 1 Cc., or 15 minims.

QUININAE BISULPHAS.—Acid Sulphate of Quinine.

Whitish crystals, or small needles, soluble in 8.5 parts water, 18 parts alcohol, insoluble in ether.

Owing to its solubility in water this salt is preferable to the sulphate when administered in dry forms, that is, powder, capsule, cachets, etc. The ordinary sulphate is converted into the bisulphate when diluted sulphuric acid is used to effect its solution in water.

Dose: 0.25 Gm., or 4 grains.

QUININAE HYDROBROMIDUM.—(Quininae Hydrobromas, U. S. '90).

White, silky needles, soluble in 40 parts water, very soluble in alcohol (0.67), ether (16) and chloroform.

Dose: 0.25 Gm., or 4 grains.

QUININAE HYDROCHLORIDUM.—(Quininae Hydrochloras, U. S. '90).—Quinine Hydrochloride.

White, glistening needles, very soluble in water (18), alcohol (0.6), ether (240), chloroform (0.8).

Dose: 0.25 Gm., or 4 grains.

Elixir Ammonii Valerianatis et Quininae, N. F.

Syrupus Hydrochlorophosphatum, N. F.

QUININAE SALICYLAS.—Quinine Salicylate.

Colorless needles, soluble in 77 parts water, 11 parts alcohol, 110 parts ether, 37 parts chloroform.

Dose: 0.25 Gm., or 4 grains (in powder form, capsule, cachets), also in pill.

QUININAE SULPHAS.—Quinine Sulphate.

Silky, light, glistening, tufted crystals, or hard needles, containing 7 molecules of water crystallization, representing nearly one-seventh its weight. Soluble in 720 parts water, 86 parts alcohol, 400 parts chloroform, 38 parts glycerine, very sparingly soluble in ether.

Dose: 0.25 Gm., or 4 grains.

Elixir Ferri, Quininae et Strychninae Phosphatum, U. S.

Dose: 4 Cc., or 1 fluidram.

RESINA.—Rosin.—From Oleoresin Turpentine.

RESINA JALAPÆ.—Active principle of Jalap.

Dose: 0.125 Gm., or 2 grains (in pill).

Pilulæ Catharticae Compositæ (et Vegetabiles), U. S.

RESINA PODOPHYLLI.—Podophyllin.—Active principle of Podophyllum.

Dose: Purgative, 0.015 Gm., equal to 15 mg., or ¼ grain.

RESINA SCAMMONII.—Active principle of Scammony.

Dose: 0.2 Gm., or 3 grains.

Extractum Colocynthis Compositum, U. S.

RESORCINOL.—(Resorcin, U. S. '90).—A Diatomic Phenol.—Meta-dihydroxy Benzene. 201

Crystals, acquiring a pinkish tint, very soluble in water (0.5) alcohol and ether.

Dose: 0.125 Gm., or 2 grains; externally in 1 per cent. to 5 per cent. solution.

Unguentum Resorcini Compositum, N. F.

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RHAMNUS PURSHIANA. — <i>Cascara Sagrada.</i> —Bark of <i>Rhamnus Purshiana</i>	128
Dose: 1 Gm., or 15 grains.	
Fluidextractum <i>Rhamni Purshianæ</i> , U. S.—Dose: 1 Cc., or 15 minims.	
Extractum <i>Rhamni Purshianæ</i> , U. S.—Dose: 0.25 Gm., or 4 grains.	
Elixir <i>Rhamni Purshianæ</i> , N. F.	
Elixir <i>Rhamni Purshianæ Compositum</i> , N. F.	
By treatment with alkalis the bitter taste is greatly lessened in the following preparations:	
Fluidextractum <i>Rhamni Purshianæ Aromaticum</i> , U. S.—Dose: 1 Cc., or 15 minims.	
Fluidextractum <i>Rhamni Purshianæ Alkalinum</i> , N. F.	
RHEUM. — <i>Rhizome of Rheum officinale</i>	128
Dose: 1 Gm., or 15 grains.	
Tinctura <i>Rhei</i> , U. S.—Dose: 4 Cc., or 1 fluidram.	
Fluidextractum <i>Rhei</i> , U. S.—Dose: 1 Cc., or 15 minims.	
Extractum <i>Rhei</i> , U. S.—Dose: 0.25 Gm., or 4 grains.	
Tinctura <i>Rhei Aromatica</i> , U. S.—Dose: 2 Cc., or 30 minims.	
Syrupus <i>Rhei</i> , U. S.—Dose: 8 Cc., or 2 fluidrams.	
Syrupus <i>Rhei Aromaticus</i> , U. S.—Dose: 8 Cc., or 2 fluidrams.	
Mistura <i>Rhei et Sodæ</i> , U. S.—Dose: 4 Cc., or 1 fluidram.	
Pulvis <i>Rhei Compositus</i> , U. S.—Dose: 2 Gm., or 30 grains.	
RHUBARB.	128
RHUS GLABRA. —Fruit of <i>Rhus glabra</i>	106
Dose: 1 Gm., or 15 grains.	
Fluidextractum <i>Rhois Glabræ</i> , U. S.—Dose: 1 Cc., or 15 minims.	
ROSA GALLICA. —Petals of <i>Rosa gallica</i>	
Confectio <i>Rosæ</i> , U. S.	
Fluidextractum <i>Rosæ</i> , U. S.	
Mel <i>Rosæ</i> , U. S.	
RUBUS. —Bark of Rhizome <i>Rubus villosus</i>	186
Dose: 1 Gm., or 15 grains.	
Fluidextractum <i>Rubi</i> , U. S.—Dose: 1 Cc., or 15 minims.	
Syrupus <i>Rubi</i> , U. S.—Dose: 4 Cc., or 1 fluidram.	
SABAL. —Fruit of <i>Serenoa serrulata</i> .—"Saw Palmetto."	
Dose: 1 Gm., or 15 grains.	
SABINA. —Tops of <i>Juniperus Sabina</i>	
Dose: 0.5 Gm., or 7½ grains.	
Fluidextractum <i>Sabinæ</i> , U. S.—Dose: 0.3 Cc., or 5 minims.	
SACCHARUM. —Sugar (sucrose).	200
SACCHARUM LACTIS. —Sugar of Milk (lactose).	
SAFROLUM. —Safrol.—Principle obtained from <i>Sassafras</i> Oil, etc.	
SALICINUM. —Glucoside from <i>Salix</i> and <i>Populus</i>	
Crystalline needles, prisms or crystalline powder, soluble in 27 parts water, 71 parts alcohol, insoluble in ether and chloroform.	
Dose: 1 Gm., or 15 grains (powder form, capsule, cachets).	
SALICYLATES.	182
SALOL.	115

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SALVARSAN (606). —Dioxydiamidoarsenobenzol. Neosalvarsan.— Dioxydiamidoarsenobenzene. Monomethane sulphinate of sodium.	102, 230
Dose: 0.2 to 0.6 Gm., given intravenously.	
SALVIA. —Leaves of <i>Salvia officinalis</i> .	
SANGUINARIA. —Rhizome of <i>Sanguinaria canadensis</i> . Dose: 0.125 Gm., or 2 grains.	
Fluidextractum Sanguinariae, U. S.—Dose: 0.1 Cc., or 1½ minims.	
Tinctura Sanguinariae, U. S.—Dose: 1 Cc., or 15 minims.	
Syrupus Sanguinariae, N. F.	
SANTAL OIL.	142
SANTALUM RUBRUM. —Wood of <i>Pterocarpus santalinus</i> .	
SANTONICA. —Flower heads of <i>Artemisia pauciflora</i>	118
SANTONINUM. —Santonin.—Principle of Santonica.	118
Flattened rhombic prisms, practically insoluble in water, soluble in alcohol (34), ether (78), chloroform (2.5). Dose: 0.065 Gm., or 1 grain.	
Trochisci Santonini, U. S.—Each 0.03 Gr. (or ½ gr.).	
SAPO. —Soap of Olive Oil and Soda.—Castile Soap.	
SAPO MOLLIS. —Soft Soap (<i>Sapo Viridis</i>).—Soap of Linseed Oil and Potassa. Linimentum Saponis Mollis, U. S.—(65 per cent.). Tinctura Saponis Viridis Composita, N. F.	
SARSAPARILLA. —Root of <i>Smilax</i> species. Dose: 2 Gm., or 30 grains.	
Fluidextractum Sarsaparillae, U. S.—Dose: 2 Cc., or 30 minims.	
Fluidextractum Sarsaparillae Compositum, U. S.—Dose: 2 Cc.	
Syrupus Sarsaparillae Compositus, U. S.—Dose: 16 Cc.	
SASSAFRAS. —Root-bark of <i>Sassafras varifolium</i> .	
SASSAFRAS MEDULLA. —Sassafras pith. Mucilago Sassafras Medullae, U. S.	
SCAMMONIUM. —Gum resin from <i>Convolvulus Scammonia</i>	134
Resina Scammonii, U. S.—Dose: 0.2 Gm., or 3 grains.	
SCILLA. —Squill.—Bulb. <i>Urginea maritima</i>	139
Dose: 0.125 Gm., or 2 grains.	
Acetum Scillae, U. S.—Dose: 1 Cc., or 15 minims.	
Syrupus Scillae, U. S.—Dose: 2 Cc., or 30 minims.	
Syrupus Scillae Compositus, U. S.—Dose: 2 Cc., or 30 minims.	
Fluidextractum Scillae, U. S.—Dose: 0.1 Cc., or 1½ minims.	
SCOPARIUS. —Tops of <i>Cytisus Scoparius</i> (Broom).	139
Dose: 1 Gm., or 15 grains.	
Fluidextractum Scoparii, N. F.	
SCOPOLA. —Rhizome of <i>Scopola Carniolica</i> .—(Japanese Belladonna Root). Dose: 0.045 Gm., equal to 45 mg., or ¾ grain.	
Fluidextractum Scopolae, U. S.—Dose: 0.05 Cc., or 1 minim.	
Extractum Scopolae, U. S.—Dose: 0.01 Gm., or ¼ grain.	
SCOPOLAMINE HYDROBROMIDUM. —Hydrobromide of alkaloid from <i>Scopola</i> . Dose: 0.0005 Gm., equal to 0.5 mg., or 1/128 grain.	

- SCUTELLARIA.**—Plant of *Scutellaria lateriflora*.
 Dose: 1 Gm., or 15 grains.
 Fluidextractum Scutellarisæ, U. S.—Dose: 1 Cc., or 15 minims.
- SENEGA.**—Root of *Polygala Senega*.
 Dose: 1 Gm., or 15 grains.
 Fluidextractum Senegæ, U. S.—Dose: 1 Cc., or 15 minims.
 Syrupus Senegæ, U. S.—Dose: 4 Cc., or 1 fluidram.
 Syrupus Scillæ Compositus, U. S.—Dose: 2 Cc., or 30 minims.
- SENNA.**—Leaflets of *Cassia acutifolia* and *Cassia angustifolia*. . . . 130
 Dose: 4 Gm., or 60 grains.
 Fluidextractum Sennæ, U. S.—Dose: 2 Cc., or 30 minims.
 Syrupus Sennæ, U. S.—Dose: 4 Cc., or 1 fluidram.
 Infusum Sennæ Compositum.
 Pulvis Glycyrrhizæ Compositus, U. S.—Dose: 4 Gm., or 60 grains.
 Confectio Sennæ, U. S.—Dose: 4 Gm., or 60 grains.
 Syrupus Sennæ Aromaticus, N. F.
 Syrupus Sennæ Compositus, N. F.
- SERPENTARIA.**—Roots of *Aristolochia Serpentaria*.
 Fluidextractum Serpentariæ, U. S.—Dose: 1 Cc., or 15 minims.
- SERUM ANTIDIPHThERICUM.**—Antidiphtheric Serum—Diphtheria Antoxin. 175, 291
 Fluid separated from the coagulated Blood of the Horse immunized through the inoculation of diphtheritic toxin.
 For a child over two years of age with laryngeal stenosis, and in other severe cases 1,500 to 2,000 units hypodermically into subcutaneous tissues of back; repeat in twenty-four hours if not improved, and again at same interval if required. In severe cases under two years old, 1,000 units as initial dose. Local and constitutional treatment should be employed as adjuncts. As prophylactic employ 500 units of the anti-toxin.
- SEVUM PRÆPARATUM.**—Prepared Sheep Suet.
- SINAPIS ALBA.**—Seed of *Sinapis alba*. 146
- SINAPIS NIGRA.**—Seed of *Brassica nigra*.
 Charta Sinapis, U. S.
- SILVER.** 110, 315
- SODII ACETAS.**—Sodium Acetate.
 Transparent prisms or granular crystalline powder, soluble in 1 part water, in 23 parts alcohol.
 Dose: 1 Gm., or 15 grains.
- SODII ARSENAS.**—Sodium Arsenate.
- SODII ARSENAS EXSICCATUS.**—Dried or exsiccated Sodium Arsenate.—Sodium arsenate deprived of its water of crystallization, therefore, nearly twice as strong as the arsenate.
 Dose: 0.003 Gm., equal to 3 mg., or 1/20 grain.
 Liquor Sodii Arsenatis, U. S.—Dose: 0.2 Cc., or 3 minims.
 Liquor Sodii Arsenatis, Pearson, N. F.
- SODII BENZOAS.**—Sodium Benzoate.
 White amorphous, or granular, crystalline powder, soluble in 1.6 parts water, in 43 parts alcohol.
 Dose: 1 Gm., or 15 grains.
 Liquor Antisepticus Alkalinus, N. F.

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SODII BICARBONAS. —Acid Sodium Carbonate—Baking Soda.— NaHCO ₃	125, 141
Dose: 1 Gm., or 15 grains.	
Trochisci Sodii Bicarbonatis, U. S.	
Mistura Sodæ et Menthæ, N. F.	
Sodii Bicarbonas Saccharatus , N. F.—For the extemporaneous preparation of effervescent powders.	
SODII BISULPHIS. —Acid Sodium Sulphite—NaHSO ₃ .	
SODII BORAS. —Borax.	
Dose: 0.5 Gm., or 7½ grains.	
Sodii Boro-Benzoeas , N. F.—Sodium Boro-Benzoate.—A mixture of sodium borate, 3; sodium benzoate, 4 parts.	
Dose: 2 Gm., or 30 grains.	
SODII BROMIDUM. —Sodium Bromide—NaBr.	
Cubical crystals, or white granular powder, soluble in 1.7 parts water, in 12.5 parts alcohol.	
Dose: 1 Gm., or 15 grains.	
Elixir Sodii Bromidi, N. F.	
Syrupus Bromidorum, N. F.	
SODII CARBONAS MONOHYDRATUS. —Sodium Carbonate containing only one molecule water of crystallization and, therefore, nearly twice as strong as the ordinary carbonate.	141
SODII CHLORAS. —Sodium Chlorate.	
Crystals or crystalline powder, soluble in 1 part water.	
Caution.—Dangerously explosive if carelessly handled or brought in contact with organic or easily oxidizable substances, sugar, sulphur, antimony sulphide, etc.	
Dose: 0.25 Gm., or 4 grains.	
SODII CHLORIDUM. —Salt—NaCl.	
Dose: As emetic, 16 Gm., or 240 grains.	
SODII CITRAS. —Sodium Citrate.	
White, granular powder, soluble in 1.1 parts water, in 0.4 parts boiling water, slightly soluble in alcohol.	
Dose: 1 Gm., or 15 grains.	
Liquor Sodii Citratis, N. F.	
Liquor Sodii Citro-Tartratis Effervescens, N. F.	
SODII HYDROXIDUM. —(Soda, U. S. '90).—Caustic Soda—NaOH.	
In mass or pencils, very deliquescent, very caustic, should be handled with care, and only after lubricating with Petroleum.	
SODII HYPOPHOSPHIS. —Sodium Hypophosphite.	
Small plates, or white granular powder, very deliquescent, soluble in 1 part water.	
Dose: 1 Gm., or 15 grains.	
Syrupus Hypophosphitum, U. S.—Dose: 8 Cc., or 2 fluidrams.	
Syrupus Hypophosphitum Compositus, U. S.—Dose: 8 Cc., or 2 fluidrams.	
SODII IODIDUM. —Sodium Iodide—NaI.	
Crystals or white crystalline powder, soluble in 0.5 parts water, in 3 parts alcohol.	
Dose: 0.5 Gm., or 7½ grains (in elixir).	
SODII NITRAS. —Chili Saltpetre—NaNO ₃ .	
SODII NITRIS. —NaNO ₂ .—Chiefly as reagent.	78
SODII PHENOLSULPHONAS. —(Sodii Sulphocarbolas, '90).—Sodium Para-phenol-sulphonate.	
Colorless prisms, soluble in 4.8 parts water.	
Dose: 0.25 Gm., or 4 grains.	

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SODII PHOSPHAS. —Di-sodium-ortho-phosphate.	132
Colorless prisms, or granular crystalline salt, soluble in 5.5 parts water, insoluble in alcohol.	
Dose: 2 Gm., or 30 grains.	
Liquor Sodii Phosphatis Compositus, U. S.—Dose: 8 Cc., or 2 fluidrams.	
SODII PHOSPHAS EFFERVESCENS.	
Granular effervescent salt, containing about 20 per cent. dried sodium phosphate.	
Dose: 8 Gm., or 120 grains.	
SODII PHOSPHAS EXSICCATUS (Exsiccated or dried).	
Dose: 1 Gm., or 15 grains.	
SODII PYROPHOSPHAS. —Not used medicinally.	
SODII SALICYLAS. —Sodium Salicylate.	
White microcrystalline or amorphous powder, soluble in 0.8 parts water, in 5.5 parts alcohol, also soluble in glycerine.	
Dose: 1 Gm., or 15 grains.	
Elixir Sodii Salicylatis, N. F.	
SODII SULPHAS. —Sodium Sulphate.—Glauber Salt.	132
SODII SULPHIS. —Sodium Sulphite.	
SODII THIOSULPHAS (Sodii Hyposulphis '90).—Chiefly as reagent and in photography.	
SPARTEINÆ SULPHAS. —Sulphate of alkaloid from <i>Scoparius</i> (<i>Spartium</i>).	89
Colorless crystals, or crystalline powder, soluble in 1.1 parts water, in 2.4 parts alcohol.	
Dose: 0.01 Gm., equal to 10 mg., or 1/5 grain (granules).	
SPIGELIA. —Rhizome of <i>Spigella marilandica</i>	118
Dose: 4 Gm., or 60 grains.	
Fluidextractum Spigellæ, U. S.—Dose: 4 Cc., or 1 fluidram; usually in form of syrup of spigella and senna.	

SPIRITUS—SPIRITS.

Alcoholic solutions of volatile substances. A number of the spirits are solutions of volatile oils and are used chiefly as flavors, adjuvants, aromatic stimulants and stomachic tonics. Of these (except Spiritus Amygdalæ Amaræ), the dosage is 2 Cc., or 30 minims.

Spiritus Acidi Formici, N. F.

SPIRITUS ÆTHERIS.—Ether, 32.5 Cc. in 100 Cc.

Dose: 4 Cc., or 1 fluidram.

SPIRITUS ÆTHERIS COMPOSITUS.—Hoffmann's Anodyne.—

Spirit of ether containing 2.5 Cc. ethereal oil in 100 Cc.

Dose: 4 Cc., or 1 fluidram.

SPIRITUS ÆTHERIS NITROSI.—Spirit Nitrous Ether.—Containing not less than 4 per cent. ethyl nitrite.

Incompatible.—Antipyrine, acetanilide, morphine, potassium iodide.

Dose: 2 Cc., or 30 minims.

Mistura Glycyrrhizæ Composita, U. S.—Dose: 8 Cc., or 2 fluidrams.

SPIRITUS AMMONIÆ.—Containing 10 per cent. NH_3 .

SPIRITUS AMMONIÆ AROMATICUS.—Solution of ammonium compounds with aromatics of lemon, lavender and nutmeg.

Dose: 2 Cc., or 30 minims (always diluted).

Mistura Sodæ et Menthæ, N. F.

- SPIRITUS AMYGDALÆ AMARÆ.**—Oil of bitter almond, 1 in 100 Cc.
- SPIRITUS ANISI.**—Oil of anise, 10 in 100 Cc.
- Spiritus Aromaticus, N. F.**
- SPIRITUS AURANTII COMPOSITUS.**—Flavoring agent.
- SPIRITUS CAMPHORÆ.**—Camphor 10 in 100 Cc.
Dose: 1 Cc., or 15 minims.
- SPIRITUS CHLOROFORMI.**—Chloroform, 6 Cc., in 100 Cc.
Dose: 2 Cc., or 30 minims.
- SPIRITUS CINNAMOMI.**—Oil of Cinnamon, 10 in 100 Cc.
- SPIRITUS FRUMENTI.**—Whisky—Alcohol, 44 to 55 per cent. by volume.
- SPIRITUS GAULTHERIÆ.**—Oil of Gaultheria, 5 in 100 Cc.
- SPIRITUS GLYCERYLIS NITRATIS** (Spirit Glonoini, '90).—Spirit of Glyceryl Trinitrate.—Spirit of Nitroglycerin.
Alcoholic solution containing 1 per cent. by weight of glyceryl trinitrate.
Caution.—In handling, liable to explode violently if alcohol is lost by evaporation. If spilled by accident, use solution of potassa.
Pillulæ Glonoini, N. F.
Dose: 0.05 Cc., or 1 minim (in solution in glycerine).
- SPIRITUS JUNIPERI.**—Oil of Juniper, 5 in 100 Cc.
- SPIRITUS JUNIPERI COMPOSITUS.**
- SPIRITUS LAVANDULÆ.**—Oil of lavender, 5 in 100 Cc.
- SPIRITUS MENTHÆ PIPERITÆ.**—Oil of peppermint, 10 in 100 Cc.
- SPIRITUS MENTHÆ VIRIDIS.**—Oil of spearmint, 10 in 100 Cc.
- Spiritus Phosphori, N. F.**—Tincture of Phosphorus.
Dose: 0.5 Cc. (or 8 minims), represents about 0.0006 Gm., or 1/100 grain phosphorus.
- Spiritus Saponatus, N. F.**—Spirit of Soap.
- Spiritus Sinapis, N. F.**—Volatile Oil of Mustard, 2 per cent.
- SPIRITUS VINI GALLICI.**—Brandy.—Alcohol, 46 to 55 per cent. volume.
- SQUILL.** 139
- STAPHISAGRIA.**—Seed of Delphinium Staphisagria.
Dose: 0.065 Gm., or 1 grain.
Fluidextractum Staphisagriæ, U. S.—Dose: 0.06 Gm., or 1 minim.
- STARCH.** 197

STILI DILUBILES—PASTE PENCILS.

("Unna Pencils.")

Pencils for the direct application of medicinal agents to the skin, suggested by Dr. Unna, and used in modern dermatological practice. The medicinal agent is incorporated with a paste consisting of starch, dextrin, tragacanth and sugar, with sufficient water to form a plastic mass. This is rolled into cylinders of about 5 mm. (1/5 inch) diameter, which are cut into sections, 5 cm. (2 inches) long, dried on parchment paper at room temperature, and wrapped in tin-foil.

- Stilus Acidi Salicylici Dilubilis**, N. F.—10 per cent.—Salicylic acid pencil, 10 per cent.
- Stilus Cocainæ Dilubilis**, N. F.—5 per cent.—Cocaine pencil, 5 per cent.
- STILLINGIA**.—Root of *Stillingia sylvatica*.
 Dose: 2 Gm., or 30 grains.
 Fluidextractum *Stillingiæ*, U. S.—Dose: 2 Cc., or 30 minims.
- STRAMONIUM** (Folia, '90).—Leaves of *Datura Stramonium*..... 153
 Dose: 0.065 Gm., or 1 grain.
 Fluidextractum *Stramonii*, U. S.—Dose: 0.05 Cc., or 1 minim.
 Extractum *Stramonii*, U. S.—Dose: 0.01 Gm., or 1/5 grain.
 Tinctura *Stramonii*, U. S.—Dose: 0.5 Cc., or 8 minims.
 Unguentum *Stramonii*, U. S.—(10 per cent. extract).
- STRONTII BROMIDUM**.—Strontium Bromide.
 Hexagonal crystals, very deliquescent, very soluble in water and in alcohol.
 Dose: 1 Gm., or 15 grains (elixir).
- STRONTII IODIDUM**.—Strontium Iodide.
 Hexagonal plates, very soluble in water and in alcohol.
 Dose: 0.5 Gm., or 7½ grains (elixir).
- STRONTII SALICYLAS**.—Strontium Salicylate.
 White crystalline powder, soluble in 18 parts water, in 66 parts alcohol.
 Dose: 1 Gm., or 15 grains (powder form).
- STROPHANTHINUM**.—Glucoside from *Strophanthus*.
 Yellowish-white crystalline powder, very soluble in water and in dilute alcohol, less soluble in alcohol and insoluble in ether or chloroform.
Strophanthin Boehringer is dispensed in glass ampoules and has been used intravenously in a solution of 1 to 1000.
 Dose: 0.0003 Gm., equal to 0.3 mg., or 1/200 grain (in tablet-triturate).
- STROPHANTHUS**.—Seed of *Strophanthus Kombé*..... 84
 Dose: 0.065 Gm., or 1 grain.
 Tinctura *Strophanthi*, U. S.—(10 per cent. U. S. VIII).—
 Dose: 0.5 Cc., or 8 minims.
- STRYCHNINA**.—Alkaloid from *Nux Vomica*..... 64
 Prismatic crystals or white crystalline powder, soluble in 6,499 parts water, 110 parts alcohol, in 6 parts chloroform, in 150 parts benzene, in 180 parts amylic alcohol, in 5,500 parts ether.
 Incompatible with alkalis, alkaline carbonates, benzoates, bromides, iodides, salicylates, mercuric chloride, tannic acid.
 Poison. Antidote: Tannic acid, emetic, chloral hydrate, chloroform, apomorphine.
 Dose: 0.001 Gm., equal to 1 mg., or 1/64 grain.
- STRYCHNINÆ NITRAS**.—Strychnine Nitrate.
 Colorless glistening needles, soluble in 42 parts water, 120 parts alcohol, 156 parts chloroform, 60 parts glycerine.
 Dose: 0.001 Gm., equal to 1 mg., or 1/64 grain.
- STRYCHNINÆ SULPHAS**.—Strychnine Sulphate.
 White crystals, or white crystalline powder, soluble in 31 parts water, 65 parts alcohol, 325 parts chloroform.
 Uses: See *Strychnina*. Largely used hypodermically.
 Dose: 0.001 Gm., equal to 1 mg., or 1/64 grain.
- STYRAX** (*Storax*).—Balsam from *Liquidambar Orientalis*.
 Dose: 1 Gm., or 15 grains.
 Tinctura *Benzoini Composita*, U. S.—Dose: 2 Cc.

- Succus Limettæ cum Pepalno, N. F.**—Lime Juice and Pepsin.
Dose: 8 Cc. (2 fluidrams), represents about 0.25 Gm. (4 grs.) Pepsin, U. S. P.
- SULPHONETHYLMETHANUM.** — Trional — Diethylsulphone-methylethylmethane.—An oxidation product of mercaptol..... 58
Lustrous, crystalline scales, soluble in 195 parts water, more readily in hot or boiling water, readily soluble in alcohol or ether.
Dose: 1 Gm., or 15 grains; in powder, capsule, cachet (should not be massed except on addition of other agents to aid in its disintegration).
- SULPHONMETHANUM.** — Sulfonal. — Diethylsulphonedimethylmethane.—An oxidation product of mercaptol, containing one group methyl more in its molecule than the preceding, to which its greater depressing effect is supposed to be due..... 57
Prismatic crystals soluble in 360 parts water, 47 parts alcohol, 45 parts ether, 16 parts chloroform, more soluble in hot, and soluble in 15 parts boiling water.
Dose: 1 Gm., or 15 grains.
- SULPHUR LOTUM.**—Washed Sulphur..... 130
Dose: 4 Gm., or 60 grains.
Pulvis Glycyrrhizæ Compositus, U. S.—Dose: 4 Gm., or 60 grains.
Unguentum Sulphuris, U. S.—(15 per cent.).
- SULPHUR PRÆCIPITATUM.**—(Lac Sulphur).
- SULPHUR SUBLIMATUM.**—(Flowers Sulphur).
For disinfection the sulphur vapor must be mixed with water-vapor to form sulphurous acid, H_2SO_3 , which is a potent germicide, the vapor alone (SO_2) not being effective. This is effected by "burning" the sulphur, wetted with Alcohol; the mixture contained in a metal dish being placed in a vessel containing water, which is vaporized by the heat.
Unguentum Sulphuris Compositum, N. F.
- SULPHURIS IODIDUM.**—Sulphur Iodide.—Sulphur, 20; iodine, 80 parts, fused in brittle masses of crystalline structure, insoluble in water.
- SUMBUL.**—Musk Root.—Root of an Umbellifera..... 96
Dose: 2 Gm., or 30 grains.
Fluidextractum Sumbul, U. S.—Dose: 2 Cc., or 30 minims.
Extractum Sumbul, U. S.—Dose: 0.25 Gm., or 4 grains.
- SUPRARENAL.** 68, 249

SYRUPUS—SYRUPS.

Syrups are saturated, or nearly so, solutions of sugar in water, containing aromatic or medicinal substances.

- SYRUPUS.**—Containing sugar 85 Gm. in 100 Cc.
- SYRUPUS ACACIÆ.**—Syrup, with acacia 10 per cent.
- SYRUPUS ACIDI CITRICI.**—("Syrupus Limonis").—Substitute for syrup of lemon, which latter does not keep.
- SYRUPUS ACIDI HYDRIODICI.**
Dose: 4 Cc., or 1 fluidram (diluted).
- SYRUPUS AMYGDALÆ.**—A flavored vehicle.
Dose: 4 Cc., or 1 fluidram.

SYRUPUS AURANTII.—Syrup Aurantii Corticis.—Prepared from the tincture of fresh orange peel; this is a most exquisite, flavored vehicle..... 199

Uses: As addition to liquid mixtures of various salts, that is, bromides, iodides, etc., about 25 Cc. (6 fldrs.) to a 100 Cc. (25 fldrs.) mixture.

SYRUPUS AURANTII FLORUM.—Orange Flower Syrup.—Especially adapted to hypophosphites and salts of iron as a flavor.

Syrupus Bromidorum, N. F.—Syrup of the Bromides.

Dose: 4 Cc., or 1 fluidram, representing about 1 Gm. (15 grs.) of the mixed bromides of potassium, sodium, ammonium, calcium and lithium, in comp. syrup of sarsaparilla.

SYRUPUS CALCII LACTOPHOSPHATIS.—Lactophosphate of Lime.

SYRUPUS FERRI IODIDI.—Ferrous Iodide, 5 per cent. weight (reduced in strength one-half, from the syrup formerly official, which was 10 per cent.).

Dose: 1 Cc., or 15 minims, through a glass tube, to avoid discoloration of the teeth.

SYRUPUS FERRI, QUININÆ ET STRYCHNINÆ PHOSPHATUM.

Dose: 4 Cc., or 1 fluidram, containing 0.08 Gm. (1.2 grs.) ferric phosphate, 0.1 Gm. (1½ grs.) quinine, and 0.0008 Gm., (1/80 gr.) strychnine.

SYRUPUS HYPOPHOSPHITUM.—Syrup of Hypophosphites.

Uses: Nerve nutrient, alterative, reconstructive.

Dose: 8 Cc., or 2 fluidrams, containing 0.3 Gm. (5 grs.) calcium hypophosphite, and 0.1 Gm. (1½ grs.) each potassium and sodium hypophosphites.

SYRUPUS HYPOPHOSPHITUM COMPOSITUS.

Dose: 8 Cc., or 2 fluidrams, containing quinine 0.008 Gm. (¼ gr.) and strychnine, 0.0008 Gm. (1/80 gr.), hypophosphite salts, calcium, 0.25 Gm. (4 grs.); potassium and sodium, each 0.12 Gm. (2 grs.); Ferric and manganese, 0.015 Gm. (¼ gr.) each.

SYRUPUS KRAMERIÆ.—Syrup of Rhatany.

SYRUPUS LACTUCARII.

SYRUPUS PICIS LIQUIDÆ.—Syrup of Tar.

Dose: 4 Cc., or 1 fluidram.

SYRUPUS PRUNI VIRGINIANÆ.—Syrup Wild Cherry.

Dose: 4 Cc., or 1 fluidram.

SYRUPUS SARSAPARILLÆ COMPOSITUS.—Sarsaparilla, 20; glycyrrhiza, 1.5; senna, 1.5; flavored with anise, gaultheria and sassafras.

Dose: 16 Cc., or 4 fluidrams.

SYRUPUS TOLUTANUS.—Tincture of tolu, 5 Cc. in 100 Cc.

Dose: 16 Cc., or 4 fluidrams.

TALCUM.—Native hydrous Magnesium Silicate.

TALCUM PURIFACTUM.

Pulvis Talci Salicylicus, N. F.

TAMARINDUS.—Pulp of fruit Tamarindus Indica (in Confectio Sennæ).

TANSY.

- TARAXACUM.**—Root *Taraxacum officinale*.
Dose: 8 Gm., or 120 grains.
Fluidextractum Taraxaci, U. S.—Dose: 8 Cc., or 2 fluidrams.
Extractum Taraxaci, U. S.—Dose: 1 Gm., or 15 grains.
Elixir Taraxaci Compositum, N. F.
- TARTAR EMETIC.**..... 149
- TEREBENUM.**—From oil of Turpentine..... 155
Liquid, consisting of dipentene and other hydrocarbons, s. g. 0.850, slightly soluble in water, but soluble in 8 times its volume of alcohol.
Dose: 0.5 Cc., or 8 minims (in liquid mixture). Mixture with syrup or emulsion like Emulsum Olei Terebinthinæ.
- TEREBINTHINA.**—Concrete oleoresin from *Pinus palustris*..... 118
- TEREBINTHINA CANADENSIS.**—Liquid oleoresin from *Abies balsamea*.
- TERPINI HYDRAS.**—Hydrate of diatomic alcohol terpine..... 155
Rhombic prisms, soluble in about 200 parts water, 10 parts of alcohol, in about 100 parts ether and 200 parts chloroform.
Dose: 0.125 Gm., or 2 grains, chiefly in elixirs:
Elixir Terpini Hydratis, N. F.
Elixir Terpini Hydratis cum Codeina, N. F.
Elixir Terpini Hydratis cum Heroína, N. F.
- THEOBROMA CACAO.**—Theobromine.....138, 321
- THEOPHYLLIN.**139, 323
- THIOSINAMINE.**—Derived from oil of mustard.....174, 326
Dose: 2 grains.
Fibrolysin, a solution of Thiosinamine and sodium salicylate; dispensed for hypodermic use in tubes containing 30 minims.
- THYMOL.**—A phenol from oil of Thyme.....118, 204
Large, translucent, rhombic prisms, very sparingly soluble in water (1,100), soluble in less than its weight of alcohol, ether or chloroform. Triturated with about equal parts of camphor, chloral, menthol or phenol it liquefies.
Dose: 0.125 Gm., or 2 grains (in capsules).
Liquor Antisepticus, U. S.
Liquor Antisepticus Alkalinus, N. F.
- THYMOLIS IODIDUM.**—Thymol Iodide.—Dithymol-di-iodide ("Aristol").—Obtained by the condensation of two molecules of thymol and the introduction of two atoms of iodine into the phenolic groups of the thymol.
Bright chocolate-colored, or reddish-yellow, bulky powder, insoluble in water or glycerine, slightly soluble in alcohol, readily soluble in ether, chloroform, collodion, fixed or volatile oils.
Uses: Antiseptic, similar to iodoform; chiefly as dusting powder, also in ointment, suppositories, solution in liquid petrolatum (10 per cent.) as spray.
- TINCTURA BENZOINI COMPOSITA.**—Benzoin, 10; aloes, 2; storax, 8; tolu, 4.—Dose: 2 Cc., or 30 minims.
- TINCTURA CANNABIS INDICÆ.**—Indian Cannabis: 10.—Dose: 0.6 Cc., or 10 minims.
- TINCTURA CANTHARIDIS.**—Cantharides: 10.—Dose: 0.3 Cc., or 5 minims.
- TINCTURA CAPSICI.**—Capsicum: 10.—Dose: 0.5 Cc., or 8 minims.

	Page
TINCTURA CARDAMOMI. —Cardamomi: 20.—Dose: 4 Cc., or 1 fluidram.	
TINCTURA CARDAMOMI COMPOSITA. —Cardamom, cinnamon, each, 2.5; caraway, 1.2; cochineal, 0.5; glycerine, 5 Cc.—Dose: 4 Cc., or 1 fluidram.	
TROCHISCI KRAMERIÆ. —Ext. Krameriæ, 0.06 Gm. (1 gr.). Uses: Astringent.	
TROCHISCI POTASSII CHLORATIS. —Potass. Chloratis, 0.15 Gm. (2½ grs.). Uses: Antiseptic, astringent (in aphthæ).	
TROCHISCI SANTONINI. —Santonin, 0.03 Gm. (½ gr.). Uses: Anthelmintic, vermifuge.	
TROCHISCI SODII BICARBONATIS. —Sodii bicarb., 0.18 Gm. (3 grs.); myristicæ, 0.01 Gm. (¼ gr.). Uses: Antacid.	
TROPACOCAINE. —Used in a 3 to 10 per cent. solution in 0.85 per cent. solution of sodium chloride for injection into the spinal canal.	44, 328
TURPENTINE.	118, 142, 155, 192
TUBERCULIN.	176, 305
TYRAMINE.	188, 328
ULMUS —Bark of <i>Ulmus fulva</i> .	

UNGUENTA—OINTMENTS.

Semi-solid mixtures of fats and oils, sometimes wax, lanolin and petrolatum, with which medicinal agents usually are intimately incorporated for external use. Intended to be applied by inunction, ointments should readily melt at the body temperature. The character of the vehicle is determined by the general therapeutic purpose, whether penetration by the ointment and absorption of the medicinal agent or only local or protective effect is desired. Of the various fats employed petrolatum does not penetrate the skin, while lanolin penetrates so readily that iodine or mercury may be conveyed by it through the skin, that their presence may be detected in the urine, shortly after inunction of such lanolin ointment. Between these two extremes are the vegetable and animal fats and oils which penetrate into the skin, and thus cause such action as may be desired of the particular medicinal agent.

Since animal and vegetable fats and oils easily become rancid and also are affected by chemical agents, such as the mercurials, the vehicle for these ointments is chiefly a mixture of equal parts of petrolatum and lanolin, which has the penetrating quality desired, but is immune from the effects of chemical agents, as well as effects of the light and atmosphere, and these ointments thus prepared according to the official formulas will remain stable and fit for use.

- UNGUENTUM.**—Ointment (Simple ointment).—White wax, 20; benzoinated lard, 80 parts.
- UNGUENTUM ACIDI BORICI.**—Boric Acid, 10 per cent.
- UNGUENTUM ACIDI TANNICI.**—Tannic Acid, 20 per cent.
- UNGUENTUM AQUÆ ROSÆ.**—Cold Cream.
- UNGUENTUM BELLADONNÆ.**—Ext. Belladonna, 10 per cent.
- Unguentum Calaminæ, N. F.**—(Turner's Cerate.)—Unguentum Zinci Carbonatis (Impure).—Calamine, 20 per cent.

- Unguentum Camphoræ, N. F.—Camphor, 22 per cent.
 UNGUENTUM CHRYSAROBINI.—Chrysarobin, 5 per cent.
 UNGUENTUM DIACHYLON.—Lead plaster, 50; oil lavender, 1; olive oil, 49 parts.
 UNGUENTUM GALLÆ.—Nutmeg pulv., 20 per cent.
 UNGUENTUM HYDRARGYRI.—Mercury, 50 per cent.
 Dose: 4 Gm. (60 grs.); may be dispensed in dosage form in paraffin paper.
 UNGUENTUM HYDRARGYRI AMMONIATA.—Ammoniated Mercury, 10 per cent.
 UNGUENTUM HYDRARGYRI DILUTUM.—Popularly "Blue Ointment."—Mercury, 33 per cent.; mixture of ung. hydrargyri, 2; petrolatum, 1 part.
 UNGUENTUM HYDRARGYRI NITRATIS.—Mercuric Nitrate, 10 per cent.
 UNGUENTUM HYDRARGYRI OXIDI FLAVI.—Yellow mercuric oxide, 10 per cent.
 UNGUENTUM HYDRARGYRI OXIDI RUBRI.—Red Mercuric Oxide, 10 per cent.—Same as the preceding.
 UNGUENTUM IODI.—Iodine, 4 per cent.—(Potassii Iodide, 4).
 UNGUENTUM IODOFORMI.—Iodoform, 10 per cent.
 UNGUENTUM PHENOLIS.—Carbolic Acid, 3 per cent.
 Unguentum Picis Compositum, N. F.—Comp. Tar. Ointment.—Oil tar, 4; tr. benzoin, 2; zinc oxide, 2 parts, in 100 parts.
 Uses: Antiseptic, antipruritic.
 UNGUENTUM PICIS LIQUIDÆ.—Tar, 50 per cent.
 UNGUENTUM POTASSII IODIDI.—Potass. iodide, 10 per cent.
 UNGUENTUM STRAMONII.—Ext. Stramonium, 10 per cent.
 UNGUENTUM SULPHURIS.—Washed Sulphur, 15 per cent.
 UNGUENTUM VERATRINÆ.—Veratrine, 4 per cent.
 UNGUENTUM ZINCI OXIDI.—Zinc Oxide, 20 per cent.
 UNGUENTUM ZINCI STEARATIS.—Zinc Stearate, 50 per cent.
 URETHANE.—A urea compound obtained by the action of ethyl alcohol upon urea..... 59
 Dose: 15 grains in capsule.
 UVA URSI.—Leaves of *Arctostaphylos Uva ursi*..... 142
 Dose: 2 Gm., or 30 grains.
 Fluidextractum Uvæ Ursi, U. S.—Dose: 2 Cc., or 30 minims.
 VACCINES.....179, 290
 VALERIANA.—Roots of *Valeriana officinalis*..... 96
 Dose: 2 Gm., or 30 grains.
 Tinctura Valerianæ, U. S.—Dose: 4 Cc., or 1 fluidram.
 Tinctura Valerianæ Ammoniata, U. S.—Dose: 2 Cc., or 30 minims.
 Fluidextractum Valerianæ, U. S.—Dose: 2 Cc., or 30 minims.
 VANILLA.—Fruit of *Vanilla planifolia*.
 Dose: 1 Gm., or 15 grains.
 Tinctura Vanilla, U. S.—Mostly as flavor.

VANILLINUM.—Vanillin.—Methylprotocatechuic aldehyde.—Obtained from vanilla, or made artificially from orthodihydroxybenzene derivatives.

Fine crystalline needles, soluble in 100 parts water, readily soluble in alcohol, ether, etc.

Dose: 0.03 Gm., or $\frac{1}{2}$ grain.

Tinctura Vanillini Composita, N. F.—Flavor.

VERATRINA.—Mixture of alkaloid from *Asagrea officinalis* (Stavesacre); an alkaloid whose dominant physiological action is that of a muscle poison; should not be confused with the active principles of Veratrum.

Grayish-white, amorphous powder, practically insoluble in water (1750), soluble in 3.2 parts alcohol, 3 parts ether and in 1 part chloroform.

Dose: 0.002 Gm., equal to 2 mg., or 1/30 grain.

Oleatum Veratrinæ, U. S.—(2 per cent.).

Unguentum Veratrinæ, U. S.—(4 per cent.).

VERATRUM (*Veratrum Viride* '90).—Rhizome *Veratrum viride* and *Veratrum album*. 91

When preparations of veratrum viride are desired, they should be specified: *V. viridis*.

Dose: 0.125 Gm., or 2 grains.

Tinctura Veratri.—U. S. VIII (10 per cent.).

Caution.—This tincture has been reduced in strength from 40 per cent. (U. S. '90), to 10 per cent. (U. S. VIII, 1905), and should be carefully designated to distinguish the weaker from the stronger.

Fluidextractum Veratri, U. S.—Dose: 0.1 Cc., or 1 $\frac{1}{2}$ minim.

VERONAL (*Diethylmalonyluria*).—A substance closely allied to æthylis carbamas. 59, 329

Dose: 5 grains in capsule.

VIBURNUM OPULUS.—Bark *Viburnum opulus*.

Dose: 2 Gm., or 30 grains.

Fluidextractum Viburni Opuli, U. S.—Dose: 2 Cc., or 30 minims.

Elixir Viburni Opuli Compositum, N. F.

Tinctura Viburni Opuli Composita, N. F.

VIBURNUM PRUNIFOLIUM.—Bark *Viburnum prunifolium*.

Dose: 2 Gm., or 30 grains.

Fluidextractum Viburni Prunifolii, U. S.—Dose: 2 Cc., or 30 minims.

Elixir Viburni Prunifolii, N. F.

VINUM ALBUM.—White Wine.—Alcohol, 8.5 to 15 per cent. by volume.

VINUM RUBRUM.—Red Wine.—Alcohol, 8.5 to 15 per cent. by volume.

VINA—VINA MEDICATA (Medicated Wines.)

Solution of medicinal substances in wine, usually sweetened and fortified by addition of alcohol. With one exception (*Vinum Cocæ*) White Wine is used owing to its containing less tannin than red wine, which would discolor with iron compounds and also precipitate alkaloids, tartar, emetic, etc.

- VINUM ANTIMONII.**—Tartar Emetic, 0.4 Gm. in 100 Cc.
 Dose: 1 Cc., or 15 minims (containing 0.4 Gm. in 100 Cc., or 0.04 Gm. in 10 Cc., or 0.004 Gm., equal to 4 mg. ($\frac{1}{16}$ gr.) in 1 Cc.
 Mistura Glycyrrhizæ Composita.—Dose: 8 Cc., or 2 fluidrams.
- Vinum Aurantii**, N. F.—Wine of Orange.
- Vinum Aurantii Compositum**, N. F.—(Elix. Aurantii Comp., Ger. Ph.).
 Dose: 4 Cc., or 1 fluidram, containing about 0.3 Gm. (5 grs.) bitter orange peel, 0.1 ($1\frac{1}{2}$ grs.) each absinthium (wormwood), menyanthes (buck bean), cascarrilla and 0.06 (1 gr.) each cinnamon and gentian in wine.
- Vinum Carnis**, N. F.—Wine of Beef.
- Vinus Carnis et Ferri**, N. F.—Feef, Wine and Iron.
 Dose: 8 Cc., or 2 fluidrams, representing about 0.25 Gm. (4 grs.) extract of beef, and 0.25 Cc. (4 minims) tincture citro-chloride of iron. See also Vinum Carnis.
- VINUM COCÆ.**—Vin. Erythroxyton.
 Dose: 16 Cc., or 4 fluidrams, representing about 1 Gm. (15 grs.) coca in red wine.
- XANTHOXYLUM.**—Bark of Xanthoxylum americanum.
 Dose: 2 Gm., or 30 grains.
 Fluidextractum Xanthoxyli, U. S.—Dose: 2 Cc., or 30 minims.
- ZEÆ.**—(Corn Silk—Stigma Maydis).—Fresh styles and stigmas of Zea Mays.
 Uses: Antilithic, anticatarrhal, diuretic.
 Fluidextractum Zeæ, N. F.—Dose: 4 Cc., or 1 fluidram.
- ZINC COMPOUNDS.** 113
- ZINCI ACETAS.**—Zinc Acetate.
 Soft white plates, soluble in 2.5 parts water, 36 parts alcohol.
 Dose: 0.125 Gm., or 2 grains (rarely used internally).
 Oleatum Zinci, N. F.
- ZINCI BROMIDUM.**—Zinc Bromide.—ZnBr₂.
 White granular powder, readily soluble in water or in alcohol.
 Dose: 0.125 Gm., or 2 grains.
- ZINCI CARBONAS PRÆCIPITATUS.**—Precipitated Zinc Carbonate.
 Impalpable white powder, insoluble in water or alcohol.
- ZINCI CHLORIDUM.**—Zinc Chloride.—ZnCl₂.
 White granular powder, or fused mass, so very deliquescent that the official solution should preferably be used by taking twice the weight required of the salt.
 Caution.—Solutions for injection should not exceed 0.2 per cent. in strength.
- ZINCI IODIDUM.**—Zinc Iodide.—ZnI₂.
 White granular powder, readily soluble in water, alcohol or ether.
 Dose: 0.065 Gm., or 1 grain.
- ZINCI OXIDUM.**—Zinc Oxide.—ZnO.
 White fine amorphous powder, insoluble in water or alcohol.
 Dose: 0.25 Gm., or 4 grains.
 Unguentum Zinci Oxidi, U. S.—(20 per cent.).

- ZINCI PHENOLSULPHONAS.**—Zinci Sulphocarbolas—Zinc Paraphenolsulphonate.
 Transparent prisms, or tabular crystals, on exposure to air and light acquiring a pink tint, soluble in 1.7 parts water or in alcohol.
 Dose: 0.125 Gm., or 2 grains (rarely used internally).
- ZINCI STEARAS.**—Zinc Stearate.
 Very fine white powder, insoluble in water, alcohol, etc., readily miscible with oils and fats.
 Uses: Antiseptic dusting powder, and in Unguentum Zinci Stearatis, U. S.—(50 per cent.).
- ZINCI SULPHAS.**—Zinc Sulphate—White Vitriol..... 146
 Transparent crystals, or granular crystalline powder, soluble in less than its weight of water (0.53), in about 3 parts glycerine, insoluble in alcohol.
 Dose: Emetic, 1 Gm., or 15 grains.
- ZINCI VALERIANAS.**—Zinc Valerate—(Zinci Valerianas, '90).
 White pearly scales, soluble in 53 parts water, 35 parts alcohol.
 Dose: 0.125 Gm., or 2 grains.
 Elixir Zinci Valerianatis, N. F.
- ZINCUM.**—Zinc (metal)—Zn.—Must be free from arsenic.
- ZINGIBER.**—Ginger.—Rhizome Zingiber officinale..... 120
 Dose: 1 Gm., or 15 grains.
 Tinctura Zingiberis, U. S.—Dose: 2 Cc., or 30 minims.
 Fluidextractum Zingiberis, U. S.—Dose: 1 Cc., or 15 minims.
 Oleoresina Zingiberis, U. S.—Dose: 0.03 Gm., or $\frac{1}{4}$ grain.
 Syrupus Zingiberis, U. S.—Dose: 16 Cc., or 4 fluidrams.
 Pulvis Rhei Compositus, U. S.—Dose: 2 Gm., or 30 grains.
 Pulvis Aromaticus, U. S.—Dose: 1 Gm., or 15 grains.
 Fluidextractum Aromaticum, U. S.—Dose: 1 Cc., or 15 minims.

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